Exabyte 430M and 430A Libraries

Installation and Operation

Exabyte®

1004025-002

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1004025-002

Revision History

Revision	Date	Description
000	July 2000	Initial release.
001	October 2000	Includes updated error codes, Clean Drive option, new reset function, and new firmware upgrade procedures.
002	April 2001	Added the Exabyte 430A AIT-2 Library.

Note: The most current information about this product is available at Exabyte's web site (www.exabyte.com).

Safety Agency Standards

The library complies with the following domestic and international product safety standards:

- UL Standard 1950, 3rd Edition, Information Technology Equipment including Electrical Business Equipment
- CSA Standard C22.2 No. 950-95, Safety of Information Technology Equipment including Electrical Business Equipment
- IEC 950/EN60950, Safety of Information Technology Equipment including Electrical Business Equipment

FCC Notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Shielded cables are required for this device to comply with FCC Rules. Use shielded cables when connecting this device to others.

Laser Safety Notice

This library complies with 21 CFR 1010.10 and 1040.11 as a Class I Laser Product, and IEC 825-1, Safety of Laser Products, Part 1: Equipment Classifications, Requirements and User's Guide.

Industry Canadian Notice per ICES-003

English This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

French Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

European Notice

This equipment has been tested and complies with the following requirements:

- EN 55022/CISPR 22, Class B
- EN 55024
- EN 61000-3-2
- EN 61000-3-3

Bureau of Standards, Metrology, and Inspection (BSMI) – Taiwan

This equipment has been tested and complies with CNS C 13438, Class B.

Australia/ New Zealand

This equipment has been tested and complies with AS/NZS 3548.

Product Warranty Caution

The Exabyte® 430M and 430A Libraries are warranted to be free from defects in materials, parts, and workmanship and will conform to the current product specification upon delivery. For the specific details of your warranty, refer to your sales contract or contact the company from which the library was purchased.

The warranty for the library shall not apply to failures of any unit when:

- The library is repaired by anyone other than Exabyte's personnel or approved agent.
- The library is physically abused or is used in a manner that is inconsistent with the operating instructions or product specification defined by Exabyte.
- The library fails because of accident, misuse, abuse, neglect, mishandling, misapplication, alteration, faulty installation, modification, or service by anyone other than the factory service center or its approved agent.
- The library is repaired by anyone, including an approved agent, in a manner that is contrary to the maintenance or installation instructions supplied by Exabyte.
- Exabyte's serial number tag is removed.
- The library is damaged because of improper packaging on return.

CAUTION

Returning the library in unauthorized packaging may damage the unit and void the warranty.

If problems with the library occur, contact your maintenance organization; do not void the product warranty by allowing untrained or unauthorized personnel to attempt repairs.

Contents

How to use this manual

This manual describes how to install, configure, operate, maintain, and troubleshoot the Exabyte 430M or 430A library.

First-time installation

If you are installing the library for the first time, refer to the following chapters:

- **Chapter 1** provides an overview of the library's features and components. **Appendix A** lists additional library and tape drive specifications.
- **Chapter 2** provides instructions for installing the library hardware, connecting the library to the SCSI bus, and powering on the library. **Appendix B** provides additional information about SCSI configurations.
- **Chapter 3** describes how to configure the library for operation on the SCSI bus and for operation with your application software. Follow the steps at the end of this chapter to verify the setup and to begin library operation.
- **Chapter 4** describes how to connect an Ethernet cable and configure the library for Ethernet communications. **Appendix A** lists Ethernet cable specifications.

Operation

During normal library operations, you do not need to intervene in cartridge processing. However, you may need to refer to these chapters for some occasional tasks:

- **Chapter 5** describes how to operate the library in different control modes, how to replace cartridges and magazines, and how to reset the library.
- **Chapter 6** describes how to monitor, clean, and reset the tape drives. It also describes how to eject cartridges manually.

Troubleshooting and service

If you need troubleshooting and service information, refer to these chapters:

- **Chapter 7** provides instructions for upgrading firmware and creating diagnostic listings.
- **Chapter 8** describes basic maintenance and how to return the library for service, if necessary.
- **Chapter 9** provides troubleshooting recommendations.
- **Appendix C** lists error codes and corrective actions.

If you need to contact Exabyte for supplies, technical support, or service, see the inside back cover of this manual.

Related publications

For information about the library and the standards used by the library, refer to the following publications.

Note: To order an Exabyte publication, see "Contacting Exabyte" on the inside back cover. To view a PDF version of an Exabyte publication, visit the Exabyte web site (www.exabyte.com).

Exabyte 430M and 430A libraries

- *Exabyte 430M Product Specification*, 1004026
- *Exabyte 430A Product Specification*, 1006130
- *Exabyte 110L, 215, 218S, 221L, and 430 SCSI Reference*, 1002055
- *Exabyte Bar Code Label Specification for 8mm Cartridges*, 308607
- *Exabyte Bar Code Label Specification for AIT-2 Cartridges*, 1005623

Mammoth-2 tape drive

- *Exabyte Mammoth-2 Product Specification*, 330874
- *Exabyte Mammoth-2 Installation and Operation*, 330875
- *Exabyte Mammoth-2 SCSI Reference*, 330876

Sony SDX-500C AIT-2 tape drive

To locate documentation for the Sony SDX-500C AIT-2 tape drive, visit the Sony web site:

- www.storagebysony.com/support/consumer.asp

Standards

- *Small Computer System Interface* (SCSI-2), ANSI X3.131
- *SCSI Parallel Interface-2 (SPI-2*), ANSI X3T10 / 1142D, Rev. 11
- *SCSI-3 Fast20 Parallel Interface (Fast-20*), ANSI X3.277
- *SCSI-3 Primary Commands,* ANSI X3.301
- *Information Technology – SCSI-3 Medium Changer Commands (SMC),* ANSI NCITS T10 / 999D
- *Helical-Scan Digital Computer Tape Cartridge*, ANSI X3B5 / 89-136, Rev. 6
- *8mm Wide Magnetic Tape Cartridge for Information Interchange – Helical Scan Recording – DA-2 Format*, ECMA-249, June 1998
- *8mm Wide Magnetic Tape Cartridge for Information Interchange – Helical Scan Recording – MammothTape-2 Format*, ECMA-293, December, 1999
- *Information Technology – 8mm Wide Magnetic Tape Cartridge for Information Interchange – Helical Scan Recording – AIT-1 Format*, ECMA-246
- *Information technology 8mm Wide Magnetic Tape Cartridge for Information Interchange – Helical Scan Recording AIT-2 with MIC format*, ISO / IEC 18810:2001
- *TapeAlert Specification*, Version 2.0, November, 1997
- *ALDC – Adaptive Lossless Data Compression (ALDC)* Algorithm; ECMA-222
- *IEEE 802.3 Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications*, 1985
- *EIA Rack Standards*, RS-310-B

Conventions used in this manual

This manual uses the following conventions:

Enter**:** Boxed text indicates keys on the operator panel.

Note: Notes provide additional information.

➤ **Important** Information next to the word "Important" helps you complete a procedure or avoid extra steps.

CAUTION

Boxed text under the word "CAUTION" provides information you must know to avoid damaging the library or tape drives or losing data.

WARNING!

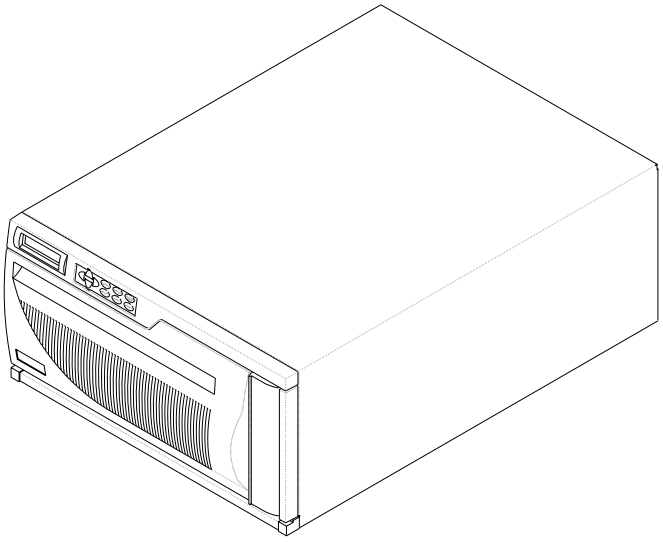
Boxed text under the heading "WARNING!" provides information you must know to avoid personal injury.

Notes

1 Product Overview

Congratulations on selecting the Exabyte® 430M Mammoth-2 (M2™) tape library or the Exabyte 430A Advanced Intelligent Tape™(AIT-2) tape library. Your new library provides unattended data storage, archiving, backup, and retrieval for midrange and high-end workstations, servers, and networks.

The library is shown below. (The exteriors of the 430M and 430A libraries are identical.)



Capacity and transfer rates

The 430M M2 library can store up to 4.5 terabytes (TB) of information and can achieve a data transfer rate of up to 432 gigabytes (GB) per hour, assuming that the installed Exabyte M2 tape drives are compressing data at a ratio of 2.5:1.

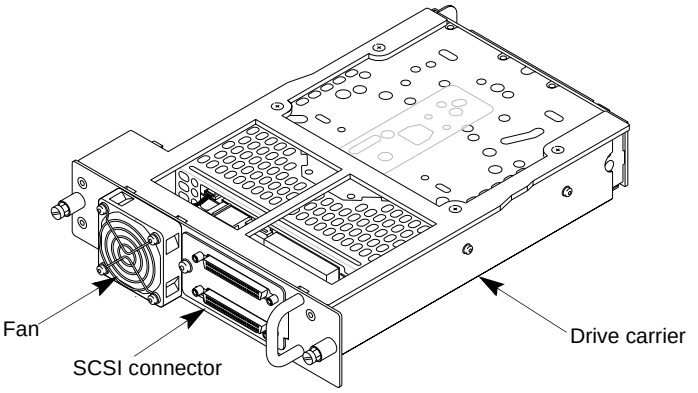
The 430A AIT-2 library can store up to 3.8 TB of information and can achieve a data transfer rate of up to 224.6 GB per hour, assuming that the installed AIT-2 tape drives are compressing data at a ratio of 2.6:1.

Library features

The library includes the following features:

- **Independent Small Computer System Interface (SCSI) controllers**. The library and tape drives each support independent sets of SCSI messages and commands, and are available in a wide, low-voltage differential (LVD) SCSI configuration. The wide SCSI configuration allows up to 16 devices to be attached to a single SCSI bus.

- **Up to four tape drives**. These drives are installed in drive carriers, which allow for easy removal and installation. As shown in the following figure, the back panel of each drive carrier includes a fan to maintain the operating temperature and SCSI connectors for connection to the SCSI bus.



- **Thirty storage slots**. Two 10-slot magazines and 10 fixed slots inside the library accommodate up to 30 cartridges.

- **Removable cartridge magazines**. The library includes two magazines, each containing 10 storage slots. You can easily access the magazines from the front panel and can use the magazines with their interlocking lids to store cartridges outside of the library.

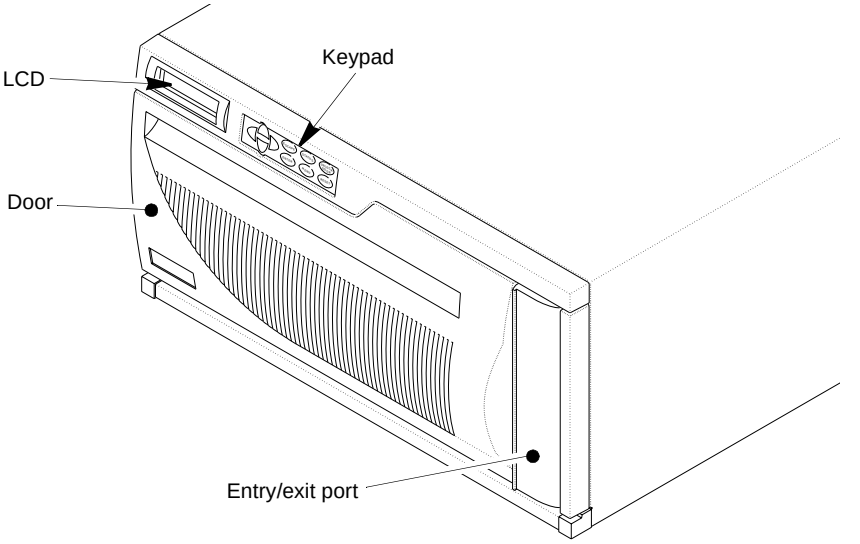
- **Exabyte Library Monitor software and Ethernet connector**. Some library models include an Ethernet connection and Library Monitor software, which can be installed on the host computer to provide remote monitoring of the library's status and configuration. The software allows you to check the library's status information from a remote location, create diagnostic listings, and upgrade firmware. With Library Monitor, up to 10 remote client users can simultaneously access library information without interrupting library operation.

- **Desktop or rack-mount configuration**. The library is designed as a desktop unit, but can be mounted in a standard 19-inch rack. Rack-mounting kits are available from Exabyte.

Library components

This section provides an overview of the library components.

Front panel components

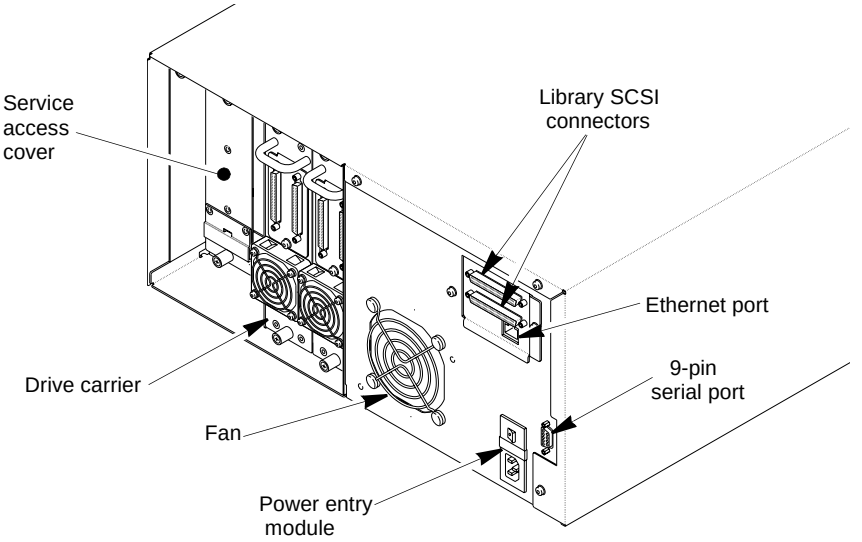


- **Door.** The door allows manual access to the library's internal components, including the tape drives and cartridges. The door is secured by a solenoid-activated, electronic locking system.

- **LCD and keypad.** The front panel includes a keypad and a two-line, 32-character LCD. The LCD and keypad allow you to view the operational status of the library, access a menu of operations, and view messages.

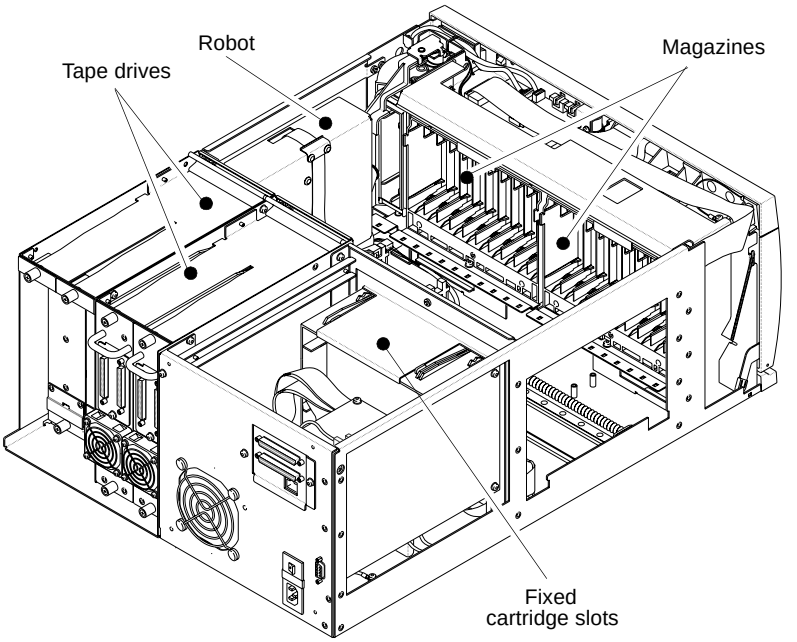
- **Entry/exit port.** The entry/exit port provides access to a caddy, which allows you to insert or remove a single cartridge without opening the front door and interrupting operation.

Back panel components



- **Drive carriers and service access covers.** Accessible from the back panel, each tape drive carrier includes a fan and two SCSI connectors. If the library contains fewer than four tape drives, the unused drive slots are protected by service access covers.
- **Fans.** The drive and library each include a fan to reduce operating temperature.
- **Power entry module.** The power entry module includes the AC power connector and power switch.
- **9-pin serial port**. A service technician can use the serial port to perform diagnostic procedures or upgrade firmware.
- **Ethernet port** (optional). The Ethernet port allows you to connect the library to a 10/100BaseT Ethernet network.
- **Library SCSI connectors.** The SCSI connectors allow you to connect the library to one or more SCSI buses.

Internal components



- **Tape drives.** The library can include up to four tape drives, which are housed in drive carriers (see page 3).
- **Robot**. The robotic cartridge handler (robot) moves cartridges between the cartridge slots, the tape drives, and the entry/exit port. An optional laser bar code scanner attached to the robot reads bar code labels on the cartridges, enabling the library to maintain cartridge inventory information.
- **Fixed cartridge slots.** The library contains 10 fixed cartridge slots next to the tape drives.
- **Magazines.** The two removable magazines contain 10 slots each. The magazines include design features to ensure that the cartridges are always inserted correctly and never fall out.

2 Hardware Installation

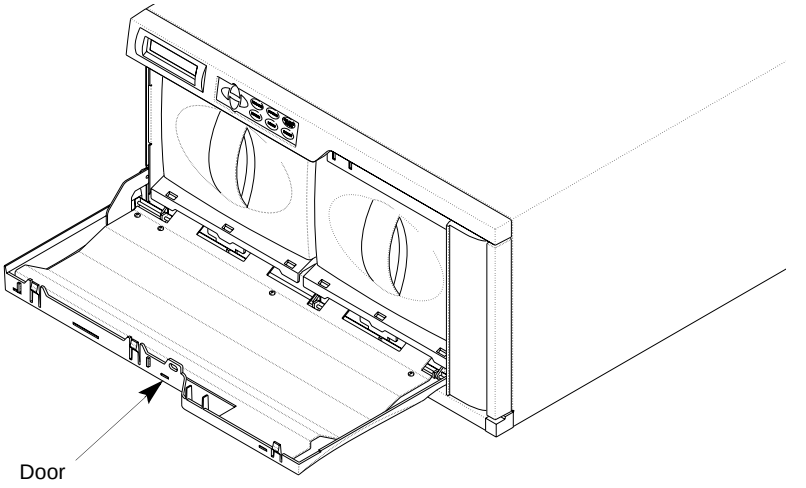
This chapter describes how to install the library hardware, which includes the following steps:

- Unpacking the library
- Obtaining accessories and equipment
- Preparing for hardware installation
- Preparing and installing cartridges
- Connecting the library to a SCSI bus
- Connecting the power cord
- Powering on the library
- Verifying the hardware installation

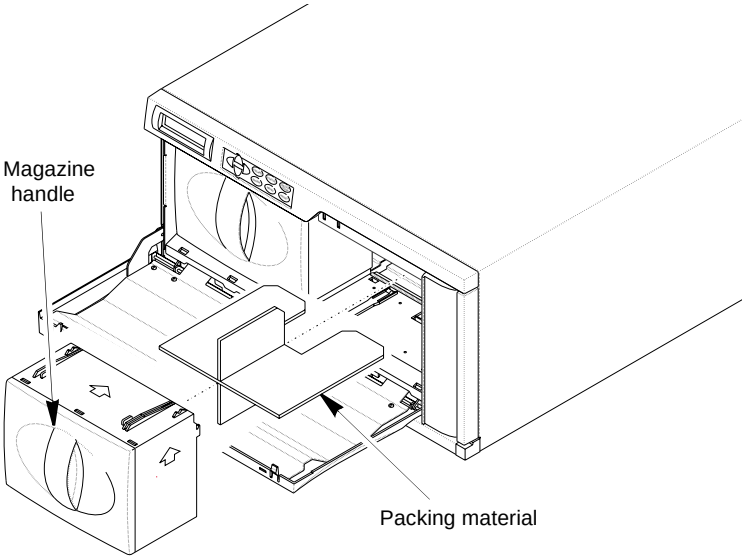
Unpacking the library

1. Remove the library from the packing materials, as shown in the unpacking steps printed on the box.

2. Grasp the library's front door by the top and pull it open, as shown in the following figure.



3. From inside the door, remove the magazine on the right side by grasping the handle and pulling it straight out, as shown in the following figure.



4. Remove the packing material from the magazine. Save all the original packing materials in case you need to ship or move the library later.

Obtaining accessories and equipment

Make certain you have all the accessories and equipment for library operation, as indicated in the table below. Many of these items are included in the library accessory box in the shipping carton. If necessary, you can purchase these items from Exabyte (see "Contacting Exabyte" on the inside back cover).

Required accessories and equipment	
Power cord	Included with the library. If you need to use a different power cord, see page 146.
SCSI cables	If these items are not included with the library, contact Exabyte to purchase them. If you want to use your own, see Appendix A for specifications.
SCSI bus terminator(s)	
Bar code labels	For libraries that have bar code scanners, sample bar code labels are included. For information about preparing your own bar code labels, refer to the bar code specification for your tape drive (see page xiii). For information about approved bar code label vendors, visit www.exabyte.com.[a]
Cartridges	If cartridges are not included with the library, contact Exabyte to purchase them. See "Selecting cartridges" on page 11 for more information about the appropriate cartridges to use.
Rack-mount hardware	If you want to install the library in a rack, contact Exabyte for the required hardware.

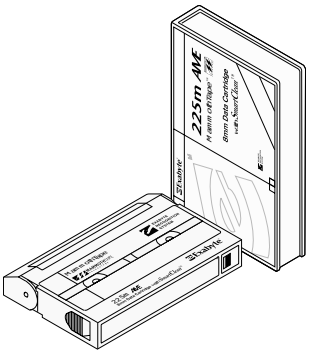
[a] If you create your own bar code labels, be sure to follow the specification precisely. For best results, use a reliable vendor to create bar code labels and use labels that contain checksum characters.

Selecting cartridges

Refer to the appropriate section below for either Exabyte M2 drives or Sony SDX-500C AIT-2 drives.

Exabyte M2 tape drives

Exabyte M2 tape drives read and write to AME cartridges with SmartClean™ technology, combining reliable AME recording media with a short segment of head cleaning material. When the M2 drive determines cleaning is needed, it locates the cleaning material and performs the cleaning automatically. AME cartridges with SmartClean are easily identified by their cobalt-blue color and are available from Exabyte in lengths of 75 meters, 150 meters, and 225 meters (see page 145 for storage capacities).

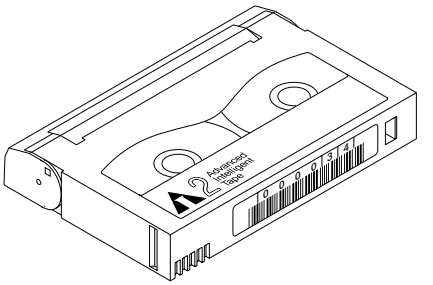


Important For optimal performance and reliability, Exabyte recommends only AME media with SmartClean for M2 tape drives. M2 can use other AME media, but will require regular cleaning with an Exabyte Mammoth cleaning cartridge.

The M2 tape drive cannot write data to or read data from metal particle (MP) tape. If you insert an MP cartridge, the M2 drive immediately ejects it. If you need to retrieve data from MP tape, contact Exabyte Technical Support (see "Contacting Exabyte" on the inside back cover) for information about data conversion services.

Sony AIT-2 cartridges

Sony SDX-500C AIT-2 drives write to the highly reliable AME cartridges for AIT-1 and AIT-2 tape drives, available in lengths of 230 meters and 170 meters.



The Sony SDX-500C tape drive automatically ejects cartridges it does not support, such as AME with SmartClean cartridges.

Note: Although the AIT cartridges include Memory in Cassette (MIC) capability, the library does not currently support this feature.

➤ **Important** Using AIT-1 cartridges in an AIT-2 drive will affect the overall performance of the drive. To ensure maximum transfer rates and capacity, use 230m AIT-2 cartridges.

Selecting cleaning cartridges

To select cleaning cartridges for your library, refer to the appropriate section below for either Exabyte M2 drives or Sony SDX-500C AIT-2 drives.

Exabyte M2 tape drives

If you do not use AME media with SmartClean exclusively, the M2 drive will require regular cleaning with a separate cleaning cartridge. Use an Exabyte Mammoth Cleaning Cartridge or a cleaning cartridge approved by Exabyte.

Sony AIT-2 tape drives

The Sony SDX-500C AIT-2 tape drives do not require periodic cleaning with a separate cleaning cartridge. However, under extreme environmental conditions, you may need to use an AIT cleaning cartridge, available from Exabyte.

Selecting application software

To obtain information about which software applications work with the library, visit Exabyte's web site (www.exabyte.com). You can install the software application on the host computer before or after library installation. However, if you install the software first, you may need to reconfigure it for use with the library.

Note: Libraries with an Ethernet configuration include a CD with Exabyte's Library Monitor software. This software allows you to monitor library operations and status from a remote location. For information on installing this software, see the readme file included with the CD. Also, follow the instructions for Ethernet configuration in Chapter 4.

Preparing for hardware installation

Before you begin hardware installation, do the following:

- Make certain the SCSI host bus adapter card installed in the host computer and the application software are compatible with the library. Compatibility information is available from www.exabyte.com.
- Ensure that the work area is free from conditions that could cause electrostatic discharge (ESD). Discharge static electricity from your body by touching a known grounded surface, such as your computer's metal chassis.
- Locate an appropriate area for the library. The library must have a level surface near a readily accessible outlet. In addition, there must be approximately 6 inches (15 cm) of open area behind the library for adequate air flow.
- If you want to install the library into a rack, contact Exabyte for a rack-mount kit, which includes hardware and installation instructions. See "Contacting Exabyte" on the inside back cover.

WARNING!

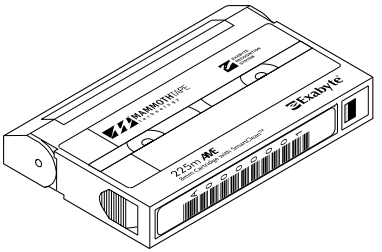
Before performing any installation or maintenance procedures, be sure that the library power switch is in the off position and that the power cord is disconnected from the library and the outlet.

Preparing and installing cartridges

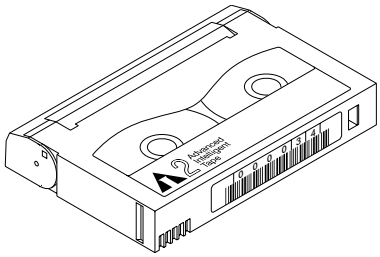
This section describes how to prepare cartridges for use in the library and install cartridges in the fixed slots and in magazines.

Preparing cartridges

1. If your library includes a bar code scanner, you can affix bar code labels to the cartridges. To do this, position the label using the ridge on the cartridge for guidance, as shown below.



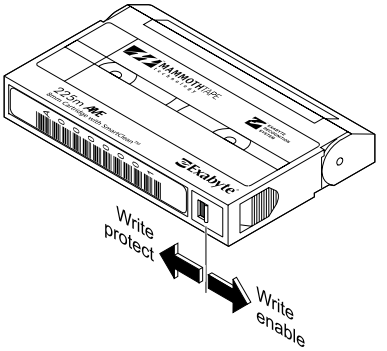
M2 cartridge with a bar code label



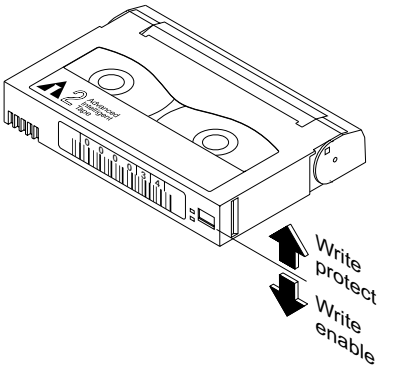
AIT-2 cartridge with a bar code label

➤ **Important** To ensure that your library will correctly read bar code labels, use labels that contain checksum characters. (The sample bar code labels provided by Exabyte contain checksum characters.) Also, make sure the Verify Barcode Checksums option is turned on (as described on page 43).

2. Make sure the write-protect switches on the cartridges are set correctly. Use a ball-point pen or similar instrument to set the write-protect switch.



Write-protect switch on the M2 cartridge

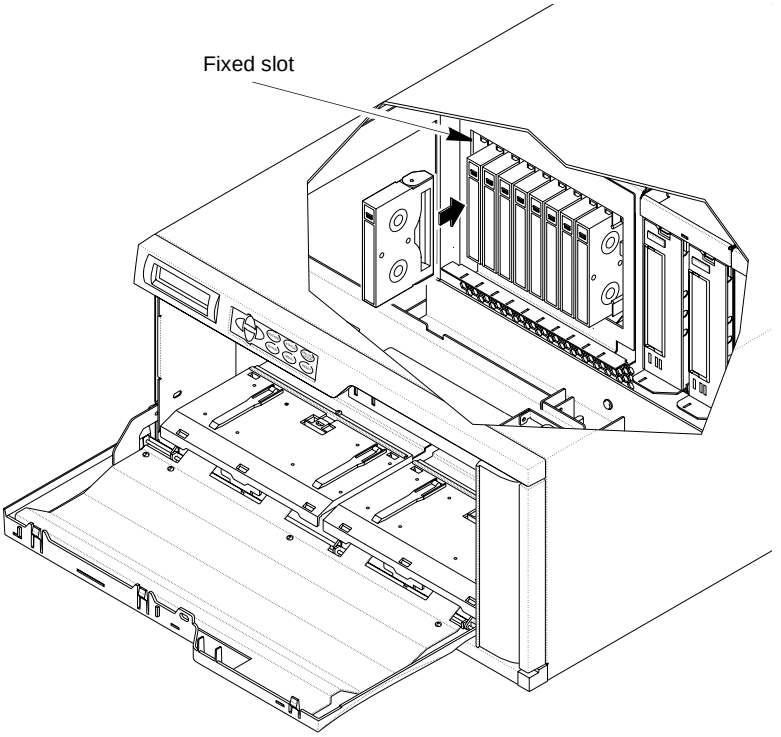


Write-protect switch on the AIT-2 cartridge

Installing cartridges in the fixed slots

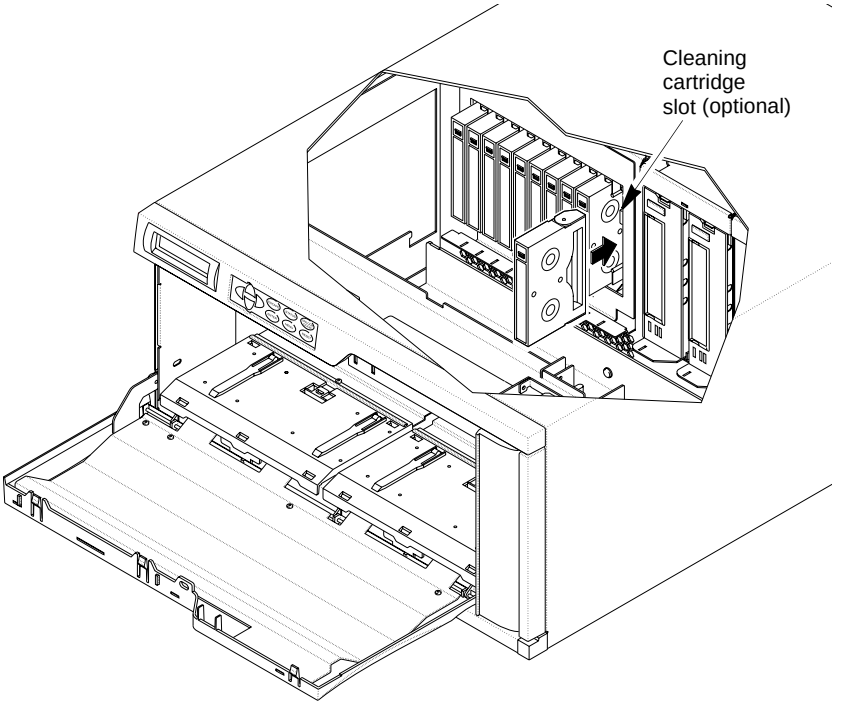
1. Remove both magazines so that the fixed slots are easily accessible. For each magazine, grasp the handle and pull straight out. (See the figure on page 9.)

2. Install cartridges into the fixed slots, with the write-protect switches up and facing out, as shown in the following figure.



Note: If your software license limits the number of cartridge slots you can use, you may need to configure the library to use less than 30 slots (see "Setting the Max Addressable Slot option" on page 45).

3. If desired, place a cleaning cartridge in the fixed slot closest to the tape drives, as shown in the following figure. To use this slot for a cleaning cartridge, you must set the Clean Slot option during library configuration (described on page 38).



Note: If you are using a cleaning cartridge and also set the Max Addressable Slot option (see page 45) to less than 30 slots, place the cleaning cartridge in the highest addressable slot. For example, if you configure the library to use 21 slots, place the cleaning cartridge in slot 21. See page 76 for the cartridge numbering scheme.

CAUTION

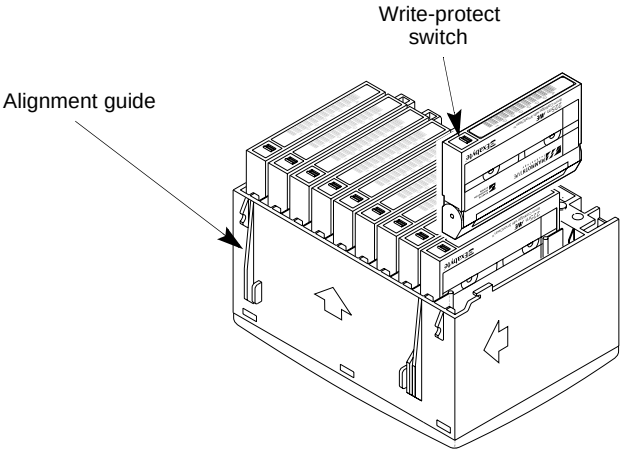
Using a cleaning method other than what is recommended on page 13 will void the tape drive warranty and can lead to premature wear of the recording heads.

Do not use video recorder cleaning tapes to clean your tape drive. Most of these tapes are too abrasive for tape drive recording heads. Some may use liquids that adversely affect the tape mechanism or crystallize on the heads and destroy them.

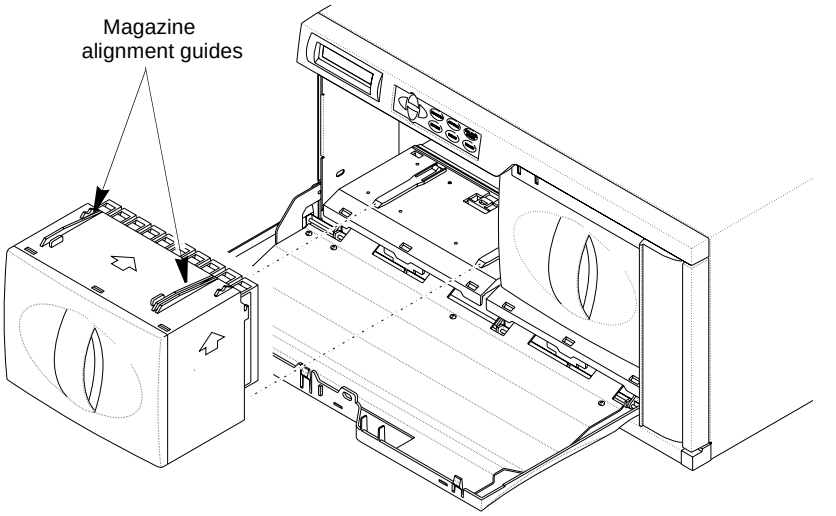
If you use a cleaning cartridge, do not rewind the cleaning material and reuse it. Doing so can contaminate the tape drive and damage the heads.

Installing cartridges in the magazines

1. Install cartridges in each magazine so that the write-protect switches are up and toward the plastic alignment guides on the top of the magazine, as shown in the following figure.



2. Insert each cartridge magazine into the library so that the plastic alignment guides are up (as shown in the following figure) and the alignment grooves are down. The magazine can only be inserted one way; do not try to force it into the library.



3. Close the library door.

Connecting the library to the SCSI bus

This section provides general guidelines for connecting the library to the SCSI bus. The library can include up to five SCSI devices: the library itself and four tape drives. Each device uses a wide, low-voltage differential (LVD) SCSI configuration.

Note: The library is shipped with two tape drives installed. You can install two more tape drives for a total of five SCSI devices. Contact Exabyte for tape drive upgrade kits.

CAUTION

Do not connect an LVD library to a high-voltage differential (HVD) SCSI bus. Doing so may cause damage to the library or other devices on the bus.

Before you begin connecting the library to the SCSI bus:

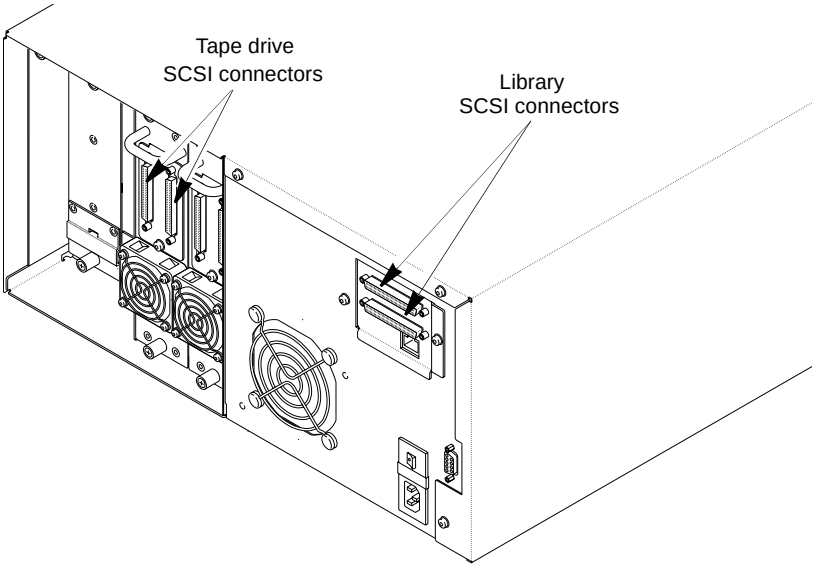
- Read Appendix B if you are unfamiliar with connecting devices on a SCSI bus, especially issues concerning LVD configurations.
- Determine how many SCSI buses you will connect to the library and which bus you will connect to which device.
- Make sure you have the necessary SCSI cables and terminators. For information about SCSI cable specifications, see page 147. If you need to order any of these items, see “Contacting Exabyte” on the inside of the back cover.
- Make certain the host computer and any peripheral devices are powered off.

CAUTION

To avoid damaging the tape drives, make sure the library is powered off when you connect the library and tape drives to the SCSI bus.

To connect the library to the SCSI bus:

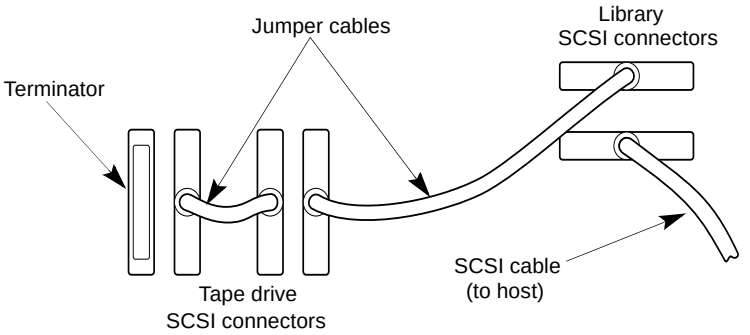
1. Connect the host's SCSI cable to one of the library SCSI connectors. The location of the library SCSI connectors is shown in the following figure.



➤ **Important** When you attach the SCSI cables to the SCSI connectors, tighten the SCSI cable jack screws to no more than 2.0 inch-pounds (2.3 kg-cm) of torque.

2. Connect other SCSI cables, as necessary, depending on your bus configuration. For the library and tape drives that will share one bus, use jumper cables to connect them. For the device at the end of the bus, install a terminator on one of the SCSI connectors for that device.

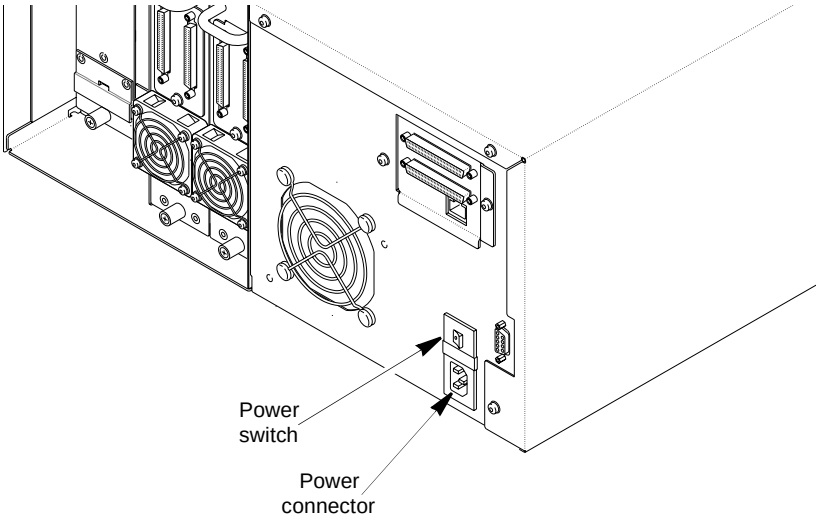
For example, the illustration below shows how the library and two tape drives can be connected to one SCSI bus.



Connecting the power cord

➤ **Important** The power cord shipped with the library is a 120 VAC three-conductor power cord for use in the United States and Canada. If you are planning to use an input voltage other than 120 volts AC, or if you plan to use the library outside of the United States or Canada, you must supply your own power cord (see page 146).

1. Make sure that the power switch on the back of the library is off (the **0** is pressed).



2. Connect the female end of the power cord to the power connector on the back of the library.

3. Plug the male end of the power cord into the power source.

   Note: The library has autoranging voltage selection, so you do not need to change the voltage setting.

Powering on the library

1. Make sure the library's door is closed.

2. Power on the host computer system.

   Note: If your host system requires that attached peripheral devices be powered on before the host, power on the library before you power on the host.

3. Push the power switch on the back of the library to the on position (the **I** is pressed).

Wait while the library performs its power-on sequence. During this time, the following activities occur:

- The cooling fans begin to operate.
- The LCD illuminates and displays power-on messages.
- Each tape drive and the library perform a power-on self-test.

Verifying the hardware installation

After the library powers on, the LCD displays the Status Screen. As shown in the example below, the first line of the Status Screen displays the product name and the second line shows status for the first drive (ready, no tape loaded). The second line continuously cycles through status for Drives 1 and 2 (and Drives 3 and 4, if installed).

Note: Drive 1 is the tape drive closest to the fixed cartridge slots; Drive 2 is located directly to the right of Drive 1.

If the library powered on as described above, continue with library configuration in Chapter 3.

If the library did not power on as described above, check the following:

- Is the power switch on?
- Is the power cord inserted correctly?
- Is the library door closed?
- Is the SCSI bus terminated?
- Is the SCSI cable connected to the library and host computer?
- Is the host computer system turned on?
- Is there an error code displayed on the library LCD? (See Appendix C.)

If you cannot resolve the problem yourself, contact Exabyte (see “Contacting Exabyte” on the inside back cover).

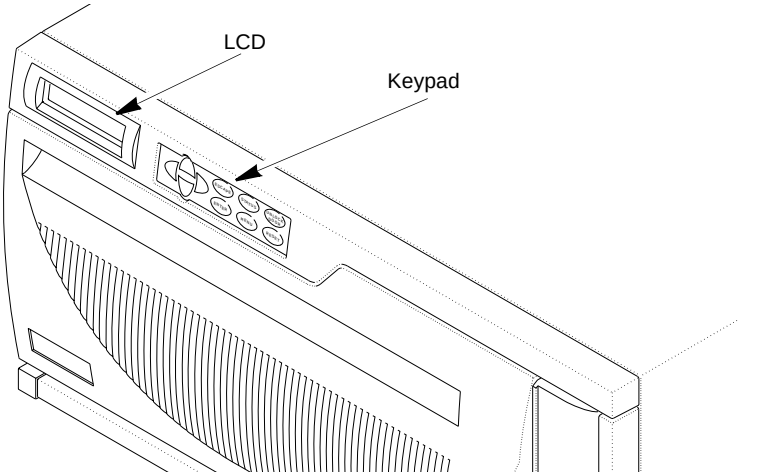
3 Configuration

This chapter provides steps for configuring the library, as follows:

- Start by reading the first section, “Using the operator panel,” for general information about the keypad, LCD, and menus.
- Then follow the instructions in “Configuring the library” on page 32 to set the SCSI IDs and other configuration options.
- Be sure to follow the guidelines at the end of this chapter in “Checking the setup” on page 49.
- Finally, read “Beginning library operations” on page 50.

Using the operator panel

The library includes a two-line LCD and keypad, called the operator panel, which allows you to interactively control library operations. Using the operator panel (shown in the following figure), you can set library options, check operating statistics, and diagnose errors.



Status Screen

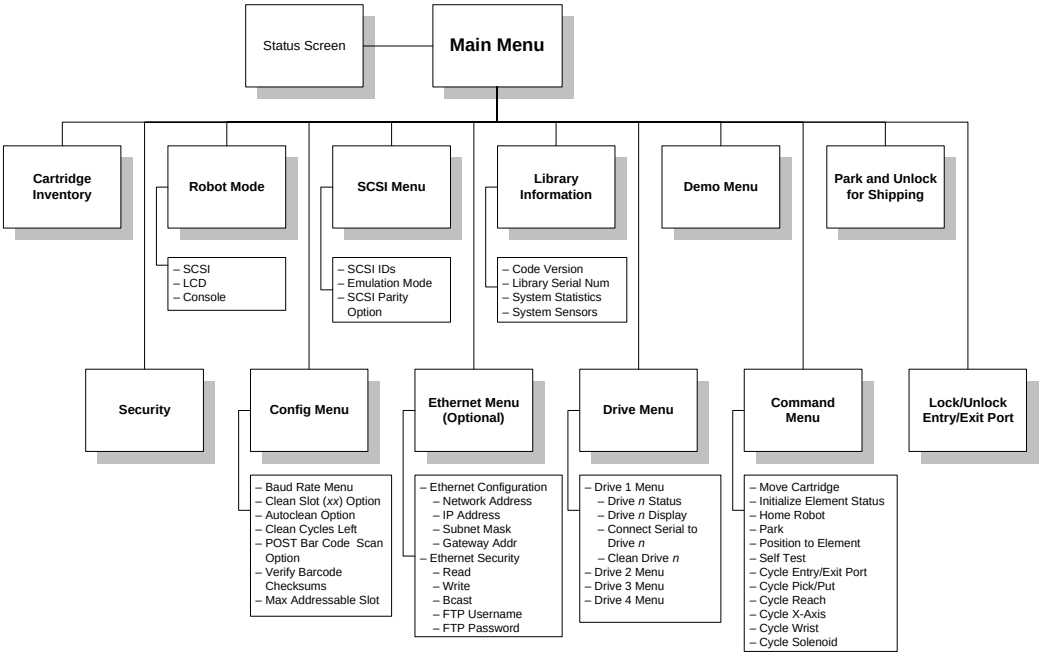
During normal operation, the Status Screen appears on the LCD (see page 26 for an example). You can use this screen to monitor library activities. By default, the Status Screen displays the current operating status of the library and tape drives.

Note: As an option, the library may also include an Ethernet connection and Exabyte Library Monitor software. You can use this software to monitor library operations remotely. For instructions, see Chapter 4.

Menus

To access the menus, press MENU from the keypad. The first menu to appear is "Cartridge Inventory." You can then press the up and down arrow keys to loop through the menu options. If a menu contains a triangle symbol (▸), you can either press ENTER to access another screen or menu, or you can change values using the operator keys (see page 31). A square symbol (■) indicates that the screen contains viewable information only.

The menu structure for the library is shown below.



The Main Menu selections are described in the following table.

Menu selection	Description
Cartridge Inventory	Displays the library's current cartridge inventory on three sequential screens.
Security (Enabled/ Disabled)	Allows you to enable or disable security with a password.
Robot Mode (SCSI/ LCD/ Console)	Displays the current robot control mode (SCSI, LCD, or Console) and allows you to change the mode.
Config (Configuration)Menu	Allows you to change the serial port baud rate, set the autoclean function, reserve a fixed slot for a cleaning cartridge, choose whether the library scans the cartridge bar code labels after power up, and set the maximum number of slots the library uses and reports to the software.
SCSI Menu	Displays the SCSI IDs for the library and each drive. Allows you to set the SCSI IDs, emulation mode, and SCSI parity checking.
Ethernet Menu	Allows you to configure the library for operation on an Ethernet network. **Note:** If your library does not include an Ethernet port, this menu does not appear on the LCD.
Library Information	Displays information about the library code versions, system statistics, and system sensors.
Drive Menu	Allows you to view the status of each tape drive and the drive LCD messages. This menu also allows you to clean a drive and establish serial port communications for diagnostics and firmware upgrades.
Demo Menu	Allows you to run various demonstration programs to observe how the library operates.
Command Menu	Allows you to issue commands for basic robot motion operations and perform diagnostic tests.
Park and Unlock for Shipping	Moves the robot to the park position for shipment and unlocks the door.
(Lock/Unlock) Entry/Exit Port	Allows you to lock or unlock the entry/exit port.

Error codes

If a hardware error occurs, an error code appears on the Status Screen, one frame at a time. Refer to Appendix C for help in diagnosing and correcting errors. You must correct the error before operation can continue.

Operator keys

Use the operator keys to perform the following actions:

Key	Description
 (Arrow keys)	Moves up, down, left, or right through the menus and screens, depending on which directional arrow you press.
ESCAPE	Returns to the previous menu or screen, or cancels an operation without saving changes.
ENTER	Selects the item next to the screen arrow or accepts a change.
STATUS	Displays the Status Screen, which shows library status, tape drive status, and operator messages.
MENU	Displays a menu of options for configuring the library, viewing information screens, and issuing commands to the library (see page 29).
UNLOCK DOOR	Stops robot operations and releases the door's interlock mechanism. The door can then be opened manually.
RESET	Displays the Reset menu, which allows you to reset the library, the library and tape drives, or the drives individually. See page 74 for more information.

Configuring the library

This section describes how to set the library's configuration options. Refer to the table below for an explanation of each configuration item and determine which ones you need to set. Then follow the appropriate steps in this section to set those options.

Note: Ethernet configuration is described in Chapter 4.

Configuration option	Description	See...
SCSI Menu:		
SCSI IDs	Setting SCSI IDs is required for library operation. View the default settings and change them if necessary.	Page 34
Emulation Mode	Setting an emulation mode is required if your application software does not support an Exabyte 430M or 430A, but does support an Exabyte 210 or 480 library.	Page 36
SCSI Parity	By default, parity checking is enabled. If desired, you can disable parity checking for the library if the SCSI adapter card connected to the library does not support parity checking.	Page 37
Configuration Menu:		
Baud Rate	Setting a baud rate is only required for communicating over the serial port for firmware upgrades and diagnostics. You do not need to set this option for normal library operations.	Page 107

Configuration option	Description	See...
Clean Slot Autoclean Clean Cycles Left	These three options allow you to set up automatic tape drive cleaning. **Note:** To use automatic cleaning, a cleaning cartridge must be installed (see page 18).	Page 38 through page 41
POST Bar Code Scan	If your software application does not automatically scan bar code labels when the library powers up or when the door is opened and closed, you can set this option so the library automatically scans the labels. By default, this option is turned off when the library is shipped. **Note:** If the library does not include a bar code scanner, "N/A" appears next to this option.	Page 42
Verify Barcode Checksums	This option instructs the library to look for bar code labels with checksum characters. If you plan to use bar code labels that include checksum characters, you should enable this feature. By default, this option is turned off when the library is shipped. **Note:** If the library does not include a bar code scanner, "N/A" appears next to this option.	Page 43
Max Addressable Slot	This option allows you to configure the library so that it uses and reports fewer slots than are physically present. This feature is useful with software applications that base licensing on the number of slots being used rather than the actual number of installed slots. If your software does not monitor the number of slots, you do not need to set this option. By default, the library reports 30 slots.	Page 45
Security Menu:		
Security	By setting security, you prevent unauthorized personnel from disrupting the operation of the library.	Page 46

Setting the SCSI IDs

This section describes how to view the default SCSI IDs for the library and change them, if necessary.

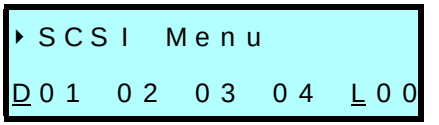
> ➤ **Important** The library and tape drives must each have a unique SCSI ID within each SCSI bus. Because you may have multiple buses, the library does not check for duplicate SCSI IDs. It is your responsibility to make sure you do not assign duplicate IDs within a bus.

To view and change the SCSI IDs:

1. If the security option has been enabled, disable it (see page 48).

2. From the operator panel's keypad, press MENU to display the menus. The first menu item to appear is "Cartridge Inventory."

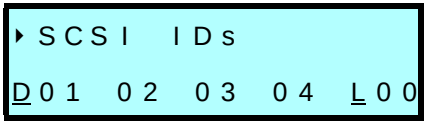
3. Press the down arrow key until "SCSI Menu" appears. The SCSI Menu screen shows the current ID settings. In the example below, Drive 1 is set to 01; Drive 2 is set to 02; Drive 3 is set to 03; Drive 4 is set to 04, and the library is set to 00.



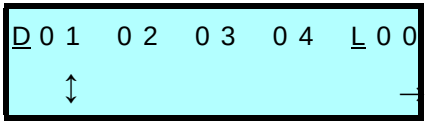
Note: Drive 1 is the tape drive closest to the fixed cartridge slots; Drive 2 is located directly to the right of Drive 1; and so on.

4. If these default IDs are correct for your library setup, you do not need to change the settings. If you want to change the settings, continue with the following steps.

5. Press ENTER. The SCSI IDs screen appears.



6. Press ENTER again to display the next screen for changing the IDs.



7. To select a drive or the library, use the left and right arrow keys to move the screen arrow (↕) across columns. For example, to select Drive 2, press the right arrow once to move the screen arrow (↕) under the second column. To change the ID, use the up and down arrow keys to scroll through values.

8. When you have set all the SCSI IDs, press ENTER to save your changes. The screen displays a status message for each drive ID you changed. When the library has finished changing the IDs, the SCSI IDs screen displays the new settings.

Setting the emulation mode

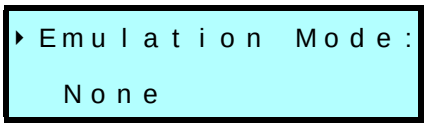
This section describes how to configure the library so that it emulates an Exabyte 210 or 480 library by returning “EXB-480” or “EXB-210” in response to a SCSI INQUIRY command. You may need to set emulation if your software package does not yet support the Exabyte 430, but does support an Exabyte 210 or 480.

To set the emulation mode:

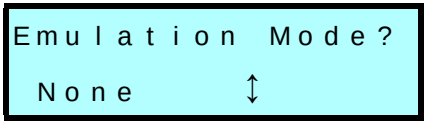
1. If the security option has been enabled, disable it (see page 48).

2. Display the SCSI Menu. If necessary, press MENU to display the menus (or return to the top of the menu selections). Press the down arrow key until “SCSI Menu” appears on the screen, then press ENTER.

3. Press the down arrow key until “Emulation Mode” appears, as shown below. This screen shows the current mode.



4. Press ENTER. The following screen appears.



5. Use the up or down arrow key to select an emulation mode, then press ENTER. Select “EXB-210” if your software supports the Exabyte 210 library; select “EXB-480” if your software supports the Exabyte 480 library. Select “Exabyte 430” if you need to override a SCSI Inquiry setting and reset the library to Exabyte 430 mode.

Setting the SCSI parity option

When the SCSI Parity option is enabled, the library checks all data coming across the SCSI bus for parity (if the SCSI adapter card connected to the library supports parity checking). This setting remains in effect across power cycles. By default, SCSI parity is turned on when the library is shipped.

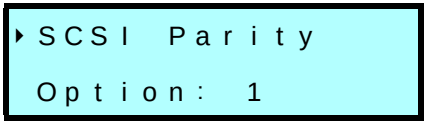
Note: Parity checking for the library can also be enabled through the application software by using the SCSI command, MODE SELECT. The method used last to set parity checking (LCD or SCSI) has precedence. Parity checking for the tape drives is set separately.

To set parity checking:

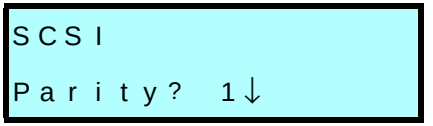
1. If the security option has been enabled, disable it (see page 48).

2. Display the SCSI Menu. If necessary, press MENU to display the menus (or return to the top of the menu selections). Press the down arrow key until "SCSI Menu" appears, then press ENTER.

3. Press the down arrow key until "SCSI Parity" appears, as shown below. This screen shows whether parity is enabled (1) or disabled (0).



4. Press ENTER. The following screen appears.



5. Use the up or down arrow key to select “1” to turn on parity checking or “0” to turn off parity checking, then press ENTER. The screen shows the new setting.

Setting the Clean Slot option

The Clean Slot option designates the right-most fixed cartridge slot (closest to the tape drives) as a permanent storage location for a cleaning cartridge.

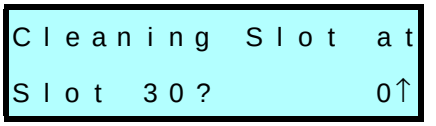
> ➤ **Important** If you change the Max Addressable Slot option (see page 45), the location of the cleaning slot also changes. The cleaning cartridge slot, if used, is always the highest storage element address enabled. For example, if you change the Max Addressable Slot option to 25, then the cleaning slot will be 25. For more information on storage element addresses, see page 76.

To set the Cleaning Slot option:

1. If the security option has been enabled, disable it (see page 48).
2. Change the control mode to LCD (see page 68).
3. Display the Config Menu. If necessary, press MENU to display the menus. Press the down arrow key until “Config Menu” appears, then press ENTER.

4. Press the down arrow key to display "Clean Slot Option," then press ENTER. The Clean Slot Option screen shows which slot is designated as the cleaning slot (30 in the example below) and whether the option is on (1) or off (0).

5. Press ENTER. The following screen appears.



6. Press the up or down arrow key to select "1," which turns on the fixed cleaning slot option or "0" to turn the option off, then press ENTER. The Clean Slot screen shows the current selection.

Setting the Autoclean option

The Autoclean option allows the library to automatically perform the cleaning process without interrupting normal library operation. With Autoclean enabled, the library monitors the cleaning requirements of each tape drive. When a drive indicates a "Needs Cleaning" status, the robot automatically removes the cleaning cartridge from the cleaning cartridge slot and inserts it into the tape drive. After completing the cleaning cycle, the library returns the cleaning cartridge to its slot and decreases the Clean Cycles Left counter by one.

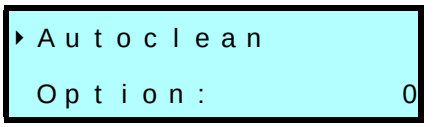
➤ **Important** If you enable Autoclean, make sure the cleaning option in your software is turned off.

To set the Autoclean option:

1. If the security option has been enabled, disable it (see page 48).

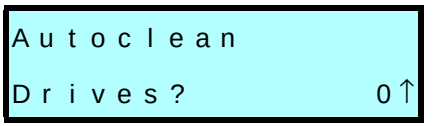
2. Display the Config Menu. If necessary, press MENU to display the menus. Press the down arrow key until "Config Menu" appears, then press ENTER.

3. Press the down arrow key until "Autoclean Option" appears. This screen shows whether Autoclean is enabled (1) or not (0).



Note: To use Autoclean, the cleaning slot must contain a cartridge and the Clean Slot option must be enabled (see page 38).

4. Press ENTER. The following screen appears.



5. Press the up or down arrow key to select "1," which turns on the Autoclean option, or "0" to turn the option off, then press ENTER.

Note: When the library's Clean Cycles Left counter reaches zero, the library disables Autoclean and displays a message on the Status Screen that reminds you to replace the cleaning tape.

Setting the Clean Cycles Left option

The Clean Cycles Left option is a counter that tracks the number of times a cleaning cartridge has been used. When you install a new cleaning cartridge, you must use this option to set the number of cleaning cycles that remain. After completing a cleaning cycle, the library automatically decreases the Clean Cycles Left counter by one.

Note: A new cleaning cartridge contains 18 cleaning cycles.

To set the Clean Cycles Left option:

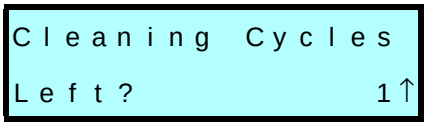
1. If the security option has been enabled, disable it (see page 48).

2. Display the Config Menu. If necessary, press MENU to display the menus. Press the down arrow key until "Config Menu" appears, then press ENTER.

3. Press the down arrow key to display "Cleaning Tape Cycles Left."

Note: To set the Cleaning Cycles Left option, the cleaning slot must contain an approved cleaning cartridge and the Clean Slot option must be enabled (see page 38).

4. Press ENTER. The following screen appears.



5. Use the arrow keys to set the number of cleaning cycles that remain on the installed cartridge, then press ENTER. For a new cleaning cartridge, set this value to 18.

Setting the POST Bar Code Scan option

When the POST Bar Code Scan option is enabled, the library automatically scans the bar code labels whenever the library door is opened and closed or whenever the library powers up. By default, this option is turned off. Enabling this option increases the amount of time the library requires to complete POST.

Note: If your library does not include a bar code scanner, the screen displays "N/A" next to this option.

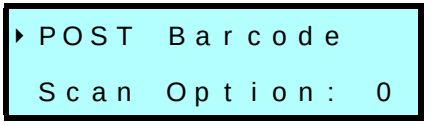
To turn on the POST Bar Code Scan option:

1. If the security option has been enabled, disable it (see page 48).

2. Display the Config Menu. If necessary, press MENU to display the menus (or return to the top of the menu selections). Press the down arrow key until "Config Menu" appears, as shown below. The second line of the Config Menu shows the current baud rate and whether Autoclean is enabled.

3. Press ENTER.

4. Press the down arrow key until "POST Bar Code Scan Option" appears. This screen shows whether bar code scanning is enabled (1) or disabled (0).



5. Press ENTER. The following screen appears.

6. Use the up or down arrow key to select "1," which turns on the option, or select "0" to turn the option off. Press ENTER. The screen displays the new setting.

Setting the Verify Barcode Checksums option

If you use bar code labels that contain checksum characters, you should enable the Verify Barcode Checksums option. If you do not use bar code labels that include checksum characters or if you mix labels containing checksum characters with labels that do not, you should turn off the Verify Barcode Checksums option. By default, this option is turned off.

Note: If your library does not include a bar code scanner, the screen displays "N/A" next to this option.

You can determine whether your bar code labels contain checksum characters by contacting your vendor or by following these steps:

a. Count the number of black bars on the label. (The number will be a multiple of 5.)

b. Divide this number by 5 to get the number of characters.

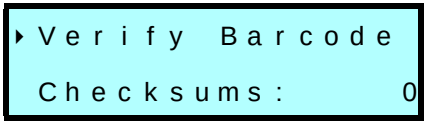
c. Subtract the number of human-readable characters on the label from the result of step b. If the result is 2, the label does not include a checksum character; if the result is 3, the label includes a checksum character.

To set the Verify Barcode Checksums option:

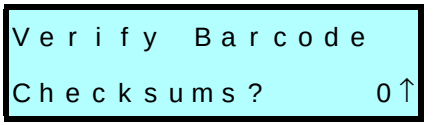
1. If the security option has been enabled, disable it (see page 48).

2. Display the Config Menu. If necessary, press MENU to display the menus (or return to the top of the menu selections). Press the down arrow key until "Config Menu" appears on the screen, then press ENTER.

3. Press the down arrow key until "Verify Barcode Checksums" appears, as shown below. This screen shows whether this option is enabled (1) or disabled (0).



4. Press ENTER. The following screen appears.



5. Use the up or down arrow key to select "1," which turns on the option, or select "0" to turn the option off. Press ENTER. The new setting appears on the screen.

Setting the Max Addressable Slot option

You can use the Max Addressable Slot option to configure the library so that it uses and reports fewer slots than are physically present. When the Max Addressable Slot is set to a value less than 30 (the default), the library will not allow any commands with source or destination element addresses greater than that number. This option is useful with software applications that base licensing on the number of slots being used rather than the actual number of installed slots.

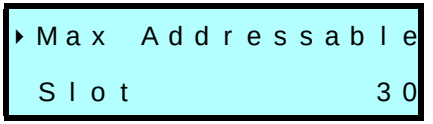
To set the Max Addressable Slot option:

1. If the security option has been enabled, disable it (see page 48).

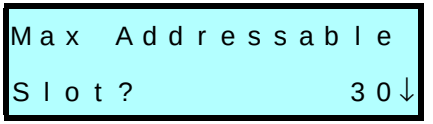
2. Change the control mode to LCD (see page 68).

3. Display the Config Menu. If necessary, press MENU to display the menus (or return to the top of the menu selections). Press the down arrow key until "Config Menu" appears, then press ENTER.

4. Press the down arrow until "Max Addressable Slot" appears, as shown below. This screen shows the current value (30).



5. Press ENTER. The following screen appears.



6. Use the up or down arrow key to select the desired slot number, then press ENTER. The screen displays the new setting.

Setting the LCD Security option

The library's security option allows you to prevent unauthorized personnel from disrupting the operation of the library. You can enable or disable security in either of two ways:

- **LCD security**. You can set the security option from the LCD, as described in this section.

- **SCSI security**. The application software can issue a SCSI MODE SELECT command to turn security on or off, as described in the SCSI reference for your library.

Whichever method you use to enable security, you must also use it to disable security. That is, if you enable security from the LCD, you must disable it from the LCD. If security is enabled by the application (SCSI), it must be disabled by the application.

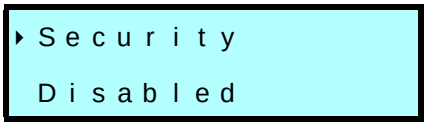
When you enable security, operators cannot perform the following activities:

- Changing the robot control mode
- Changing configuration settings (except baud rate)
- Changing the SCSI Menu options
- Changing the Ethernet options
- Communicating with the tape drives across the serial port
- Cleaning the tape drives
- Using the Demo Menu
- Using the Command Menu
- Unlocking the entry/exit port (LCD security only)
- Unlocking and opening the front door (LCD security only)

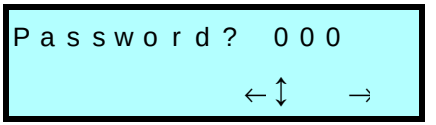
If you attempt to perform any of these operations when security is enabled, the library displays a message that states security is active.

Enabling security from the LCD

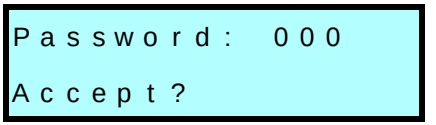
1. Display the Security screen. If necessary, press MENU to display the menus (or return to the top of the menu selections). Press the down arrow key until "Security" appears, as shown below. This screen shows whether security is currently enabled or disabled.



2. Press ENTER. An informational message appears, then the following screen appears.



3. Use the left and right arrow keys to move across the columns. Use the up and down arrow keys to select a number. When you have selected a password, press ENTER. A prompt similar to the one below appears.



4. Press ENTER to accept the new password. The Security Screen then displays "LCD Password." (Security remains in effect across resets.)

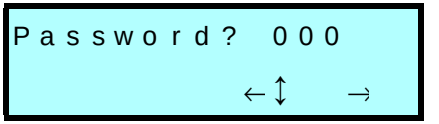
➤ **Important** You must use the same password to turn security off.

Disabling security from the LCD

1. Display the Security screen. If necessary, press MENU to display the menus (or return to the top of the menu selections). Press the down arrow key until "Security" appears, as shown below. If security is enabled, "LCD Password" appears on this screen.

   Note: Security may have been enabled by your application using a SCSI command (the LCD will display "SCSI"). If this is the case, security must be disabled by your application. Refer to your software documentation or to the library's SCSI reference.

2. Press ENTER. The following screen appears.



3. Use the left and right arrow keys to move across the columns. Use the up and down arrow keys to select a number. Press ENTER. Security is then disabled.

Checking the setup

After you install the library hardware (described in Chapter 2) and configure the library, check the setup by performing the suggested exercises below. While these exercises are not required, it is a good idea to verify that your software and hardware are properly communicating before you begin operations.

- Use the options on the Demo Menu or Command Menu to exercise the hardware. These exercises help determine whether the library hardware components are operating properly. See "Performing hardware exercises" beginning on page 75 for instructions.

  Note: These hardware exercises require changing the control mode to LCD, as described on page 68. When you complete the exercises, be sure to change the library's control mode back to SCSI, which is the standard operating mode for the library.

- If you have not already done so, install the software application on the host computer. Instruct the software to perform a cartridge load and unload operation for each tape drive. This test helps determine whether the software and library are communicating properly.

- Back up several megabytes of data to each tape drive and perform a comparison check on the backed up data. This determines whether the software and tape drives are communicating properly.

If the library and tape drives are not operating as expected, see Chapter 9 for troubleshooting information. If there is an error code displayed on the LCD, see Appendix C. If you cannot resolve the problem yourself, contact Exabyte (see "Contacting Exabyte" on the inside back cover).

Beginning library operations

Before you begin library operations, check the following:

- The robot gripper does not contain a cartridge.
- The cartridge magazines are installed.
- The library door is closed.
- The library is in the proper control mode.
  SCSI is the standard operating mode (see "Changing the robot control mode" on page 68).

When you have successfully completed the hardware installation and library configuration, use the application software to perform backup and restore operations automatically. During normal library operations, you do not need to intervene in the cartridge processing. However, for occasional tasks you may need to perform, refer to Chapter 5, "Library Operation," and Chapter 6, "Tape Drive Operation."

In addition, if your library includes the Exabyte Library Monitor software and you want to use it to monitor library operations remotely, follow the instructions in Chapter 4, "Ethernet Configuration."

4 Ethernet Configuration

As an option, your library may include an Ethernet connection, which you can use to remotely view the library's operation (with the Library Monitor software) and to access the library's firmware via FTP. (For more information about upgrading firmware, see Chapter 7.)

This chapter describes the following:

- Configuring the library for use with Ethernet
- Viewing the Ethernet Security screens
- Connecting the Ethernet cable
- Monitoring the Ethernet LEDs

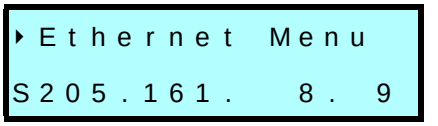
Note: For libraries that include an Ethernet connection, a Library Monitor software CD is also included in the library shipment. For software installation instructions, refer to the readme file on the CD. (The Monitor software can be installed before or after Ethernet configuration.)

Setting Ethernet addresses

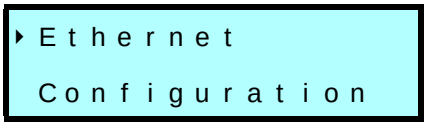
This section describes how to set the network addresses that will enable the library to communicate in the Ethernet network. For more detailed information about these addresses, see the table on the next page and the readme file for the Library Monitor software.

To set the Ethernet addresses:

1. From the operator panel keypad, press MENU to display the menus. Press the down arrow key until "Ethernet Menu" appears. This menu shows the current Ethernet addresses, similar to the ones in the following example.



2. Press ENTER. The Ethernet Configuration menu appears, as shown below.



3. Press ENTER. The Network Address screen appears.

There are four screens for setting Ethernet configuration options: Network Address, IP Address, Subnet Mask, and Gateway Address. Each is described in the following table.

4. For each screen, press ENTER to display another screen for setting values, use the arrow keys to select the values, then press ENTER when you are done.

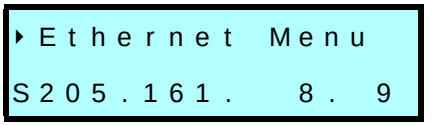
Ethernet address	Description
Network address	Selects the method used to set the Internet Protocol (IP) address of the library, as follows: ▪ Static – The library uses a fixed IP Address, which is assigned in the IP Address field, described below. ▪ DHCP – The library uses an IP address assigned by the network DHCP (Dynamic Host Configuration Protocol) server. Exabyte recommends using a Static IP address, since DHCP may require periodic reinstallation of the Library Monitor software.
IP Address	Sets the IP address of the library, which acts as a Simple Network Management Protocol (SNMP) device in the network, or displays the IP address obtained by the DHCP server.
Subnet Mask	Sets the subnet (subnetwork) mask, a set of numbers that allows communication to be routed to designated devices within the network. **Note:** This option displays "N/A" if the network address is set to DHCP.
Gateway Address	Sets the default TCP/IP (Transmission Control Protocol/Internet Protocol) gateway address, which allows communication to be routed outside the subnet. **Note:** This option displays "N/A" if the network address is set to DHCP.

Setting Ethernet security

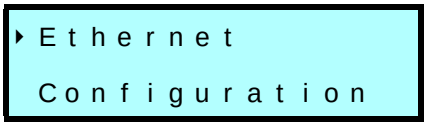
The Ethernet security screens allow you to view the read-only values for the following community access strings: Read, Write, and Broadcast. Community strings provide security for Simple Network Management Protocol (SNMP) communication. Ethernet security also displays the user name and password for the secure transfer of library and Ethernet firmware upgrades via File Transfer Protocol (FTP).

To view the Ethernet security screens:

1. From the operator panel keypad, press MENU to display the menus. Press the down arrow key until "Ethernet Menu" appears.

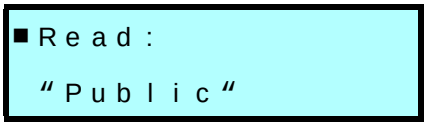


2. Press ENTER. The Ethernet Configuration menu appears, as shown below.



3. Press the down arrow until "Ethernet Security" appears.

4. Press ENTER. The first screen to appear is shown below.



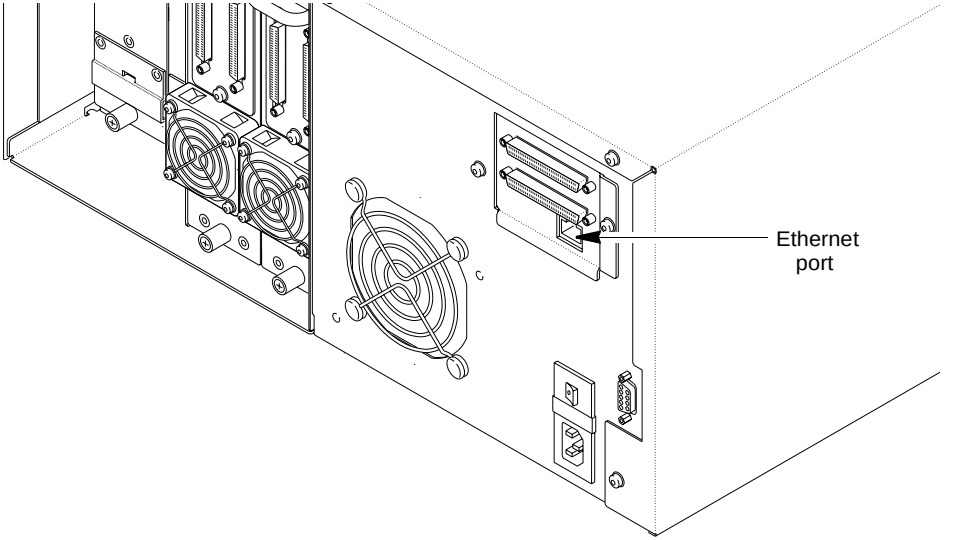
The following table describes each Ethernet security screen.

Note: If security is enabled (either from the LCD or SCSI), these options display asterisks (****).

Ethernet security	Description
Read	Displays the alphanumeric string for the Read Community contained in the SNMP administration framework.
Write	Displays the alphanumeric string for the Write Community contained in the SNMP administration framework.
Bcast (Broadcast)	Displays the alphanumeric string for the Broadcast Community contained in the SNMP administration framework.
FTP User	Displays the FTP user name, up to 20 characters. The default is "anonymous."
FTP PW (Password)	Displays the FTP password, up to 20 characters. The default is "Exabyte."

Connecting the Ethernet cable

This section describes how to connect the library to the server by attaching an Ethernet cable to the Ethernet port. The Ethernet port is located on the back of the library, as shown in the following figure. (For Ethernet cable specifications, see page 148.)



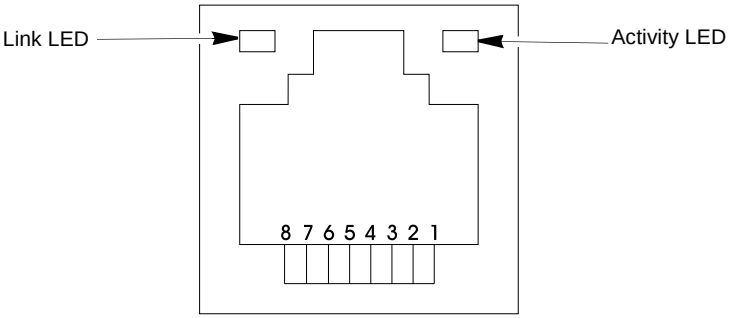
To connect the Ethernet cable:

1. Insert one end of the cable into the Ethernet port until you hear it snap into place.

2. Connect the other end of the cable to the server where you plan to install the Exabyte Library Monitor software.

Monitoring the Ethernet LEDs

The Ethernet light-emitting diodes (LEDs) indicate the operating status of the Ethernet connection. The two LEDs are located above the Ethernet port, as shown below.



The Link LED turns on when a link to the network has been established. The Activity LED blinks when data transmission or reception is taking place.

Notes

5 Library Operation

This chapter describes the following library operations you may need to perform:

- Replacing cartridges and magazines
- Storing cartridges
- Changing the robot control mode
- Viewing the cartridge inventory
- Resetting the library
- Performing hardware exercises
- Displaying information about the library

Note: The application software automatically controls the library's robotics to perform backup and restore operations. You do not need to intervene in the cartridge processing; however, you may need to occasionally perform the tasks described in this chapter.

Replacing cartridges and magazines

This section describes the following:

- Replacing cartridges by using the entry/exit port
- Replacing magazines by opening the front door

Replacing cartridges using the entry/ exit port

To replace individual cartridges in the library, use the entry/exit port on the front of the library:

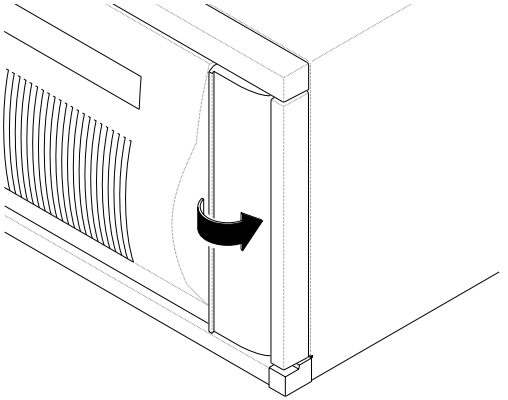
1. If the security option has been enabled, disable it (see page 48).

2. Change the control mode to LCD (see page 68).

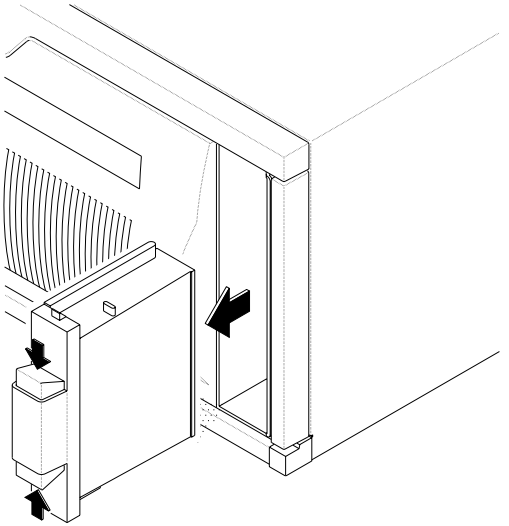
3. Use the Move Cartridge command to move a cartridge from one of the storage slots to the entry/exit port. For instructions on using the Move Cartridge command, see "Using the Command Menu" on page 78. For the element numbering scheme, see page 76. The entry/exit port is element number 81.

4. From the operator panel's keypad, press MENU to display the menus, then press the up arrow until "Unlock Entry/Exit Port" appears (shown below). Press ENTER to unlock the entry/exit port.

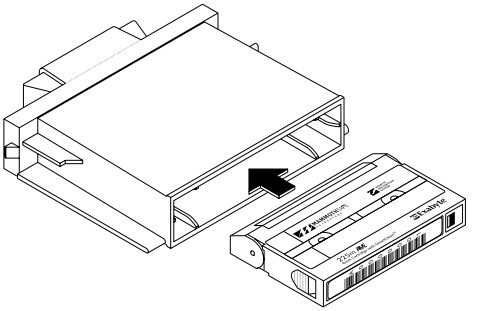
5. Rotate the entry/exit port door, from left to right.



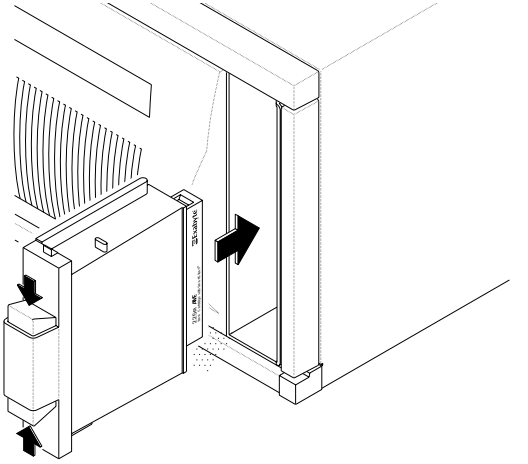
6. Press the top and bottom buttons to release the entry/exit port caddy, then pull it out.



7. Insert the cartridge in the caddy, with the write-protect switch facing out, as shown below.



8. Press the top and bottom buttons on the entry/exit port caddy, then insert the cartridge back into the entry/exit port. Make sure the write-protect switch is at the top.



9. Close the entry/exit port door.

10. From the operator panel's keypad, display "Lock Entry/Exit Port" and press ENTER.

11. Use the Move Cartridge command to move a cartridge from the entry/exit port to a storage slot or tape drive. See page 76 for the element numbering scheme.

12. If necessary, re-enable security and change the control mode back to its original operating mode.

Replacing magazines by opening the front door

You can replace magazines by opening the front door.

Note: When you open and close the library's front door, the library performs a cartridge inventory process, which may take up to 80 seconds. If you only need to replace individual cartridges, see "Replacing cartridges using the entry/exit port" on page 60.

Opening the front door

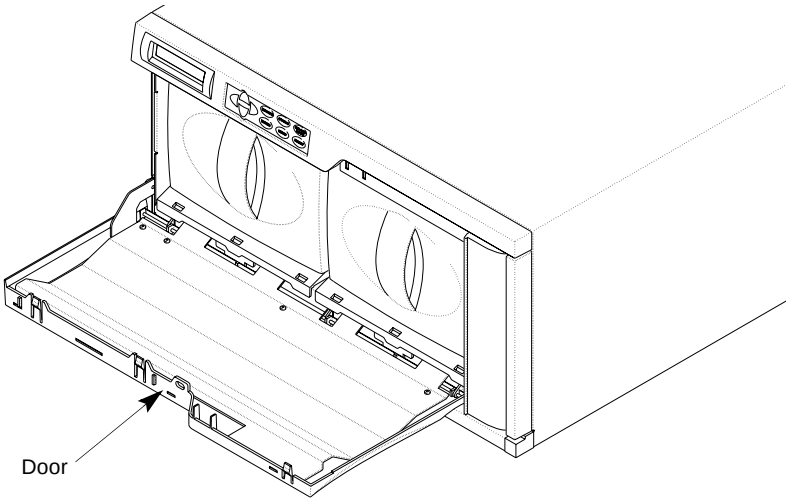
1. If the security option has been enabled, disable it (see page 48).

2. On the operator panel's keypad, press the UNLOCK DOOR button. At the Unlock Door prompt, press ENTER.

3. Wait while the library moves the robot to the park position (at the far right).

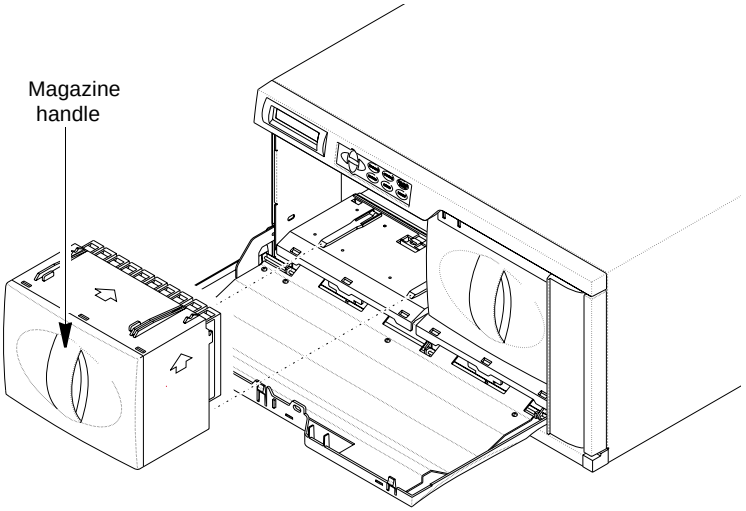
> **CAUTION**
>
> Do not force the door open. The door's interlock mechanism may be prevented from releasing by security or by the application software.

4. Pull open the door as shown in the following figure.



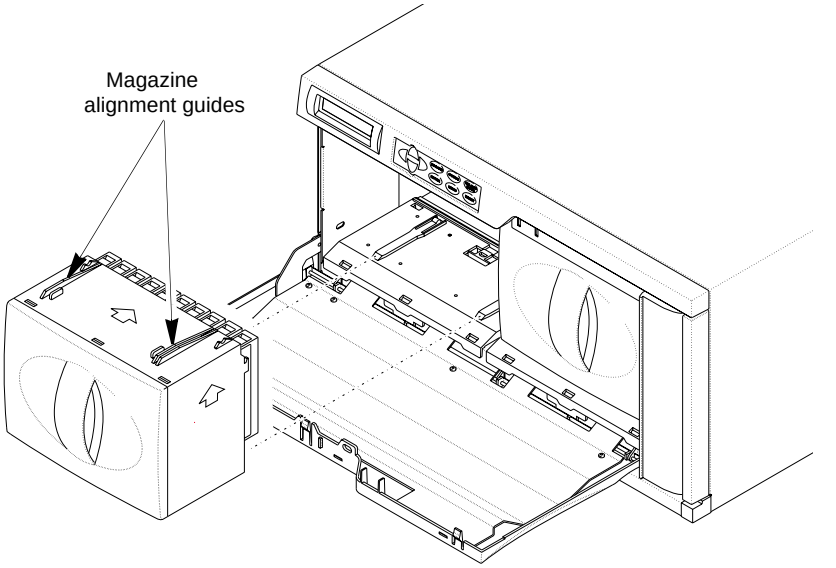
Replacing the magazines

1. From inside the door, remove the magazine by grasping the handle and pulling it straight out.



2. If desired, replace cartridges in the magazines (see “Installing cartridges in the magazines” on page 19).

3. Insert the magazine into the library so that the plastic alignment guides are up (as shown in the following figure) and the alignment grooves are down. The magazine can only be inserted one way; do not try to force it into the library.



Closing the front door

1. Close the front door. Make sure it is closed completely so that the door locks can engage. The door locks automatically.

2. If necessary, re-enable security.

Storing cartridges

To maximize the shelf life of your tapes and ensure data integrity, follow these guidelines when storing cartridges:

- **Store cartridges in a suitable environment**. Follow the specifications for storage temperature and other environmental requirements, as described on the cartridge packaging. Do not allow the temperature and humidity in the storage environment to fluctuate.

- **Keep the storage location as free of airborne particulates as possible**. To eliminate obvious sources of particulates, do not permit anyone to smoke, eat, or drink near the storage area, and do not store cartridges near a copier or printer that may emit toner and paper dust.

- **Store cartridges with the write-protect switch in the protected position** (see page 16).

- **Store cartridges as soon as possible** after you remove them from the library. Immediate storage helps avoid many of the conditions that can damage tapes, such as temperature and humidity fluctuation, particulate contamination, and excessive handling.

- **If possible, store cartridges in a cartridge magazine**. In the cartridge magazine, cartridges are protected from airborne contaminants by a clear plastic cover. With the cover in place, the magazines can be stacked on top of each other to make the most efficient use of storage space.

Changing the robot control mode

To determine which interface will control robot motion, you can set the library to one of the following control modes: SCSI , LCD, or Console. These control modes allow you to operate the library with the application software (SCSI), or perform diagnostic functions on the library (LCD or Console). The standard operating mode is SCSI, which is also the default setting for the library.

Note: Control mode settings remain through power cycles.

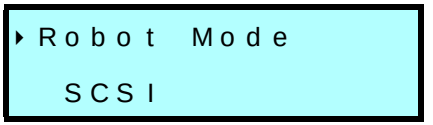
Control modes are described in the following table.

Control mode	Description
SCSI mode	In this standard operating mode, the application software controls the motion of the robot by issuing SCSI commands across the SCSI bus. **Note:** The application software can issue commands to the library regardless of the control mode. However, the library must be in SCSI mode for the software to control robot motion.
LCD mode	If you want to perform any operations from the operator panel that involve moving the robot, you need to set the library to LCD mode.
Console mode	In this mode, you can control the motions of the robot from a remote Console program connected to the library's 9-pin serial port. For more information about the Console program, see Chapter 7.

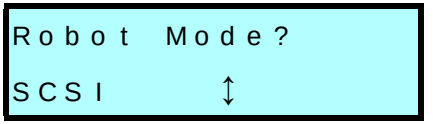
To change the control mode:

1. If the security option has been enabled, disable it (see page 48).

2. Press MENU to display the menus, then press the down arrow until “Robot Mode” appears. The Robot Mode screen shows the currently activated mode.



3. Press ENTER. An informational message appears, then the following screen appears.



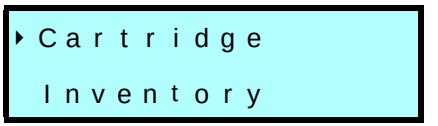
4. Use the arrow keys to select the desired mode and press ENTER. The screen shows the new selection.

Viewing the cartridge inventory

The Cartridge Inventory screens allow you to view information the library maintains for each storage element (the magazine slots, the fixed slots, the tape drives, the entry/exit port, and the robot).

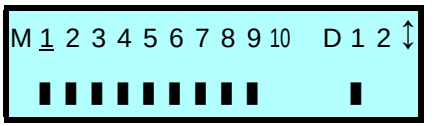
To view the cartridge inventory:

1. From the operator panel keypad, press MENU to display the menus. The first menu item to appear is "Cartridge Inventory," as shown in the following example.

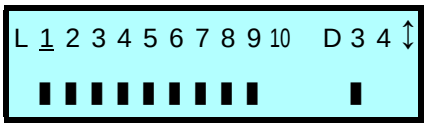


2. Press ENTER to display the first inventory information screen. Press the down arrow key to display additional screens.

   There are three screens that depict inventory information. The first screen shows information about the slots in the right-side magazine (M 1 through 10) and for Drives 1 and 2 (D 1 and 2).

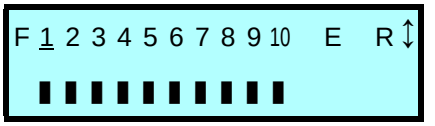


   The second screen is for the left-side magazine (L1 through 10) and Drives 3 and 4 (D3 and 4), as shown below.



   The third screen is for the fixed cartridge slots (F1 through 10),

the entry/exit port (E), and the robot (R), as shown below.



On the second line of the cartridge inventory screens, these characters indicate the following information:

- A bar (▮) under the element number indicates that a cartridge is stored in that element.
- A blank space indicates that no cartridge is stored in that element.
- A dash (-) indicates that the slot is not usable because it is beyond the value set for the Maximum Addressable Element.
- A question mark (?) indicates that the Occupied flag for that element is not valid.

3. To view information about a specific element, use the left and right arrow keys to move across the columns. The underline indicates the currently selected element. In the previous screen example, the first fixed slot is selected (1).

4. After you select an element, press ENTER to display the Index and Type information for this element. Use the up and down arrow keys to scroll through the fields.

The following table provides a description of each field.

Cartridge Inventory field	Description
Index:	Displays the element index. (See page 76.)
Type:	Indicates the type of element: either a cartridge slot, drive, robot, or entry/exit port (EEP).
Warning:	Displays 0 if there are no failures or errors associated with this element or displays an error code. See Appendix C for a list of error codes and corrective actions.
Occupied:	Indicates whether the element contains a cartridge (1) or not (0).
Valid:	Indicates if the Occupied flag is accurate (1) or is questionable (0).
Accessible:	Indicates if the element is accessible (1) or not (0). If the element is a magazine slot, it is accessible if the magazine is installed. If the element is a tape drive, it is accessible if the drive is installed in the drive bay and there is not a cartridge loaded inside the drive.
Present:	Shows whether the tape drive or magazine is installed (1) or not (0) or if the entry/exit port is locked (1) or unlocked (0). **Note:** If the element references a slot, this flag indicates whether the corresponding magazine is installed.
Label/Valid:	Indicates whether the Label field is valid (1) or not (0).
Label Error:	Indicates if the bar code scan was successful (0) or displays an error condition: 60 – The bar code scanner could not read the bar code label because there was no label on the cartridge. 62 – The bar code scanner could not read the label because the magazine is not present. 64 – The bar code scanner could not read the label because of a problem with the checksum character.
Sndvol Match: (Send Volume Match)	Indicates whether the cartridge label matched the template sent with the last SCSI SEND VOLUME TAG command (1) or not (0).

Cartridge Inventory field	Description
Source:	Displays the index of the last storage element from which the cartridge was moved. If the Source displays “255,” the cartridge in that element has not been moved since the last reset.
Address:	Displays the SCSI element address.
Reserved:	Indicates whether the element is reserved by a host (1) or not (0).
Rsv Host ID:	Displays the SCSI ID of the host that has reserved the element (if it is reserved).
Reserve ID:	Displays the ID that the element is reserved under. This is a number assigned by a host when the reservation was made. If there is no reservation, the Reservation ID and Host ID columns display “0.”
X Axis:	Displays the distance the robot must move along the X axis to the specified element location.
W Axis:	Indicates the direction the robot must face to access the element. A value of 0 indicates the robot must face the front of the library; a value of 500 indicates the robot must face the back of the library.
Total Puts: (Drive Loads:)	Shows the number of times the library placed a cartridge in that element. (If the element is a slot, this field shows “Total Puts” since the last reset. If the element is a drive, it shows “Drive Loads” since the first power-on.)
Total Put Retries: (Drive Reloads:)	Shows the number of times the library retried placing a cartridge in that element. (If the element is a slot, this field shows “Total Put Retries” since the last reset. If the element is a drive, it shows “Drive Reloads” since the first power-on.)
Total Pick Retries: (Drive Pick Retries:)	Shows the number of times the library retried picking from that element. (If the element is a slot, this field shows “Total Pick Retries” since the last reset. If the element is a drive, it shows “Drive Pick Reloads” since the first power-on.)

Resetting the library

Resetting the library causes it to perform its power-on self-test and check for the presence of the cartridge magazine and cartridges. To reset the library, you can turn it off then back on again, or you can use the front panel as described in this section.

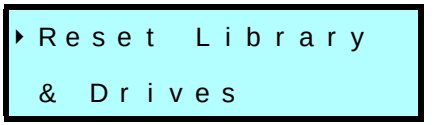
CAUTION

Before resetting the library, make sure the library or tape drives are not communicating across the SCSI bus. Resetting may disrupt communications.

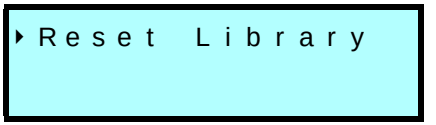
➤ **Important** Resets from the front panel do not cause cartridges loaded in the drives to be ejected. If cartridges are in the drives during a reset, make sure that it is safe to overwrite the cartridges before performing a backup. If you perform a backup without checking the loaded cartridges, you may lose important data from a previous backup.

To reset the library from the front panel:

1. Press the RESET key. The following screen appears.



2. If you want to reset the library and all the tape drives, press ENTER at this screen. Or, if you want to reset the library only, use the down arrow key to display "Reset Library," shown below. Then press ENTER.



Note: See page 103 for information about resetting tape drives individually.

3. At the confirmation prompt, press ENTER again. The library performs the reset operation.

Note: If the library is performing a cartridge move operation when it is reset, it completes the move operation before it performs the power-on self-test.

Performing hardware exercises

This section describes hardware exercises you can perform from the operator panel. Many of the tasks may be necessary if you want to test library hardware operations.

Hardware exercises are available from the Demo Menu and Command Menu. The Demo Menu provides options for running the library in a continuous demo mode, where the robot randomly moves cartridges between slots. The Command Menu provides options for performing specific robot movements.

Note: You can also perform diagnostics using the library's Console interface. The Help screen in Console shows all the available commands. For information, see Chapter 7.

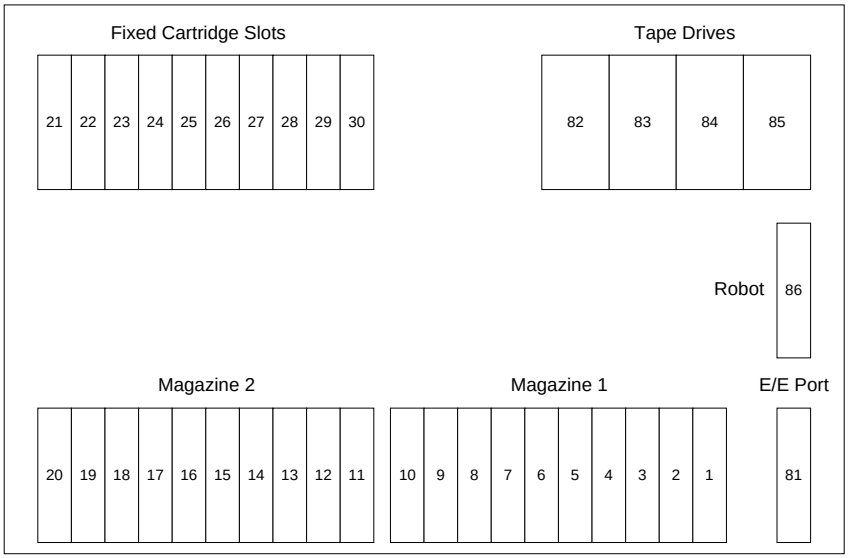
Using elements

Elements are the physical locations in the library that can accept a cartridge (the robot, the magazine slots, the fixed slots, the entry/exit port, and the tape drives).

Element indexes

Each element has an element index, which enables the library to identify the elements. Many LCD functions require you to use element indexes. For example, to move a cartridge using the Diagnostics Menu, you must specify the source and destination element indexes. The source is either a cartridge slot or the tape drive where the robot will pick a cartridge. The destination is either the slot or the tape drive where the robot will place the cartridge.

The following diagram shows the element index assignments for the library.



Element addresses

Your application software may use element addresses to identify elements in the library. The difference between an element index and an element address is that an index is a fixed number set in the library's firmware, whereas an address can be changed by your application software (using the SCSI command, MODE SELECT).

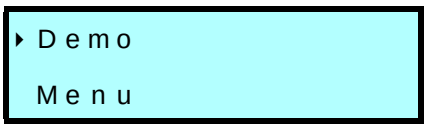
The library's default element addresses correspond to the element indexes.

Using the Demo Menu

The Demo Menu causes the robot to randomly move cartridges from slot to slot, including the fixed cartridge slots.

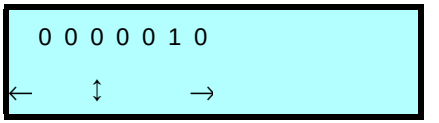
To run a demo:

1. If necessary, disable security (see page 46).
2. Change the robot mode to LCD (see page 68).
3. Make sure there is at least one cartridge present and one empty slot before you begin the test.
4. From the operator panel keypad, press MENU to display the menus. Press the down arrow key until "Demo Menu" appears, as shown below.



5. Press ENTER. The following screen appears.

   Note: For the 430A library, two additional screens appear: Use Drive and Load Drive. In these screens, select Yes (Y) or No (N) to indicate whether you want the tape drive used in the demo (Use Drive screen) and whether you want cartridges loaded in the drive (Load Drive screen). Press ENTER after each screen.



6. Use the arrow keys to set the number of moves (the left and right arrow keys move across the columns; the up and down arrow keys change the numbers). Then press ENTER.

7. The library begins the demo and displays status messages. If you want to abort a demo in progress, press ESCAPE.

Using the Command Menu

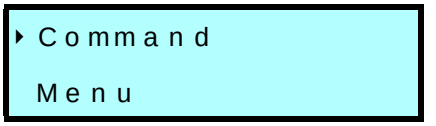
The Command Menu provides basic exercising functions for components in your library. Refer to the diagram on page 76 for the element indexes. These numbers correspond to the library components and are necessary for some commands.

To use the Command Menu to exercise components:

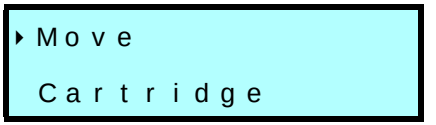
1. If necessary, disable security (see page 46).

2. Change the control mode to LCD (see page 68).

3. From the operator panel keypad, press MENU to display the menus. Press the down arrow key until "Command Menu" appears, as shown below.



4. Press ENTER. The LCD displays the first command.



5. Use the up or down arrow keys to select one of the commands (described in the following table), then press ENTER.

6. When the command is finished, the screen displays a status message. Press ESCAPE to return to the Command Menu or to abort a command in progress.

The following table describes each command.

Command	Description
Move Cartridge	Moves a cartridge from one location to another. You must specify source and destination elements (see page 76). **Important:** Do not insert a cartridge in a tape drive. The tape drive will not automatically eject the cartridge.
Initialize Element Status	Scans cartridges and checks for cartridge presence.
Home Robot	Causes the robot to move to the home position in front of the tape drives, then open and close its gripper.

Command	Description
Park	Moves the robot to the park position at the right side of the library and rotated toward the back (facing the tape drives).
Position to Element	Positions the robot in front of a tape drive, fixed cartridge slot, or a magazine slot. You must specify the destination element (see page 76).
Self Test	Causes the robot to perform a self test, as follows: ▪ Moves from its current position to a position in front of Drive 1. ▪ Rotates 180 degrees on the wrist axis and moves to a position in front of slot 1. ▪ Rotates 180 degrees on the wrist axis and returns to a position in front of Drive 1.
Cycle Entry/Exit Lock	Causes the entry/exit port to lock and unlock.
Cycle Pick/Put	Causes the robot to move in and out of a slot a specified number of times.
Cycle Reach	Causes the robot to move in and out on the reach axis.
Cycle X-Axis	Causes the robot to move left and right on the horizontal (X) axis.
Cycle Wrist	Causes the robot's wrist to rotate from the rear-facing position to the front-facing position.
Cycle Solenoid	Exercises the solenoid that controls the locking mechanism on the front door.

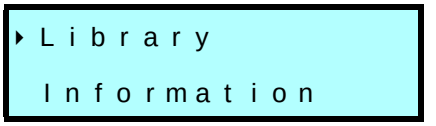
Displaying library information

This section describes how to view the following library information:

- Code (firmware) version and serial number
- Statistics (data about robot operations and elements)
- System sensors (data about the library's mechanical sensors)

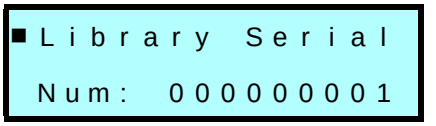
Viewing the code version and serial number

1. From the operator panel keypad, press MENU to display the menus. Press the down arrow key until "Library Information" appears, as shown below.



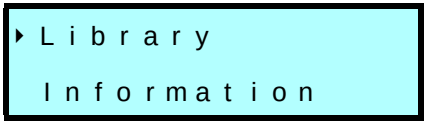
2. Press ENTER. The screen displays the library code version, similar to the example below.

3. Press the down arrow key to display the serial number.



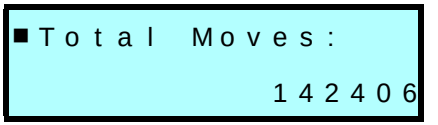
Viewing statistics

1. From the operator panel keypad, press MENU to display the menus. Press the down arrow key until “Library Information” appears, as shown below.



2. Press ENTER. The screen displays the library code version. Press the down arrow key twice until “System Statistics” appears, as shown below.

3. Press ENTER. The first statistic to appear is Total Moves, as shown in the example below.



4. To display additional Statistics screens, press the down arrow.

The following table describes the information in the Statistics screen.

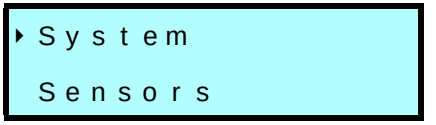
System statistic[a]	Description
Total Moves	The number of times the robot has picked a cartridge and placed it in a slot or tape drive.
Pick Retries	The number of times the robot retried picking a cartridge.
Put Retries	The number of times the robot retried placing a cartridge.
Rotate Retries	The number of times the robot retried rotating on the wrist axis.
PTE Retries	The number of times the robot performed a position to element (PTE) retry.
Powerup Count	The number of times the library has been power cycled.

[a] Cumulative over the life of the library.

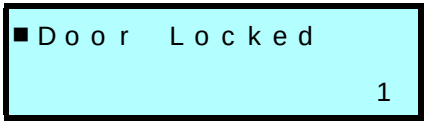
Viewing system sensors

1. From the operator panel keypad, press MENU to display the menus. Press the down arrow key until "Library Information" appears, as shown below.

2. Press ENTER. The screen displays the library code version. Press the down arrow key until "System Sensors" appears, as shown below.



3. Press ENTER. The first screen to appear is Door Locked, as shown in the example below.



The following table describes the information in the System Sensors screens.

System sensor	Description
Door Locked:	The front door is locked (1) or unlocked (0).
Door Closed 1:	The first front door sensor is on (1) or off (0).
Door Closed 2:	The second front door sensor is on (1) or off (0).
Cartridge Seated:	A cartridge is seated in the robot (1) or the robot is empty (0).
Reach Position:	The robot fingers are closed (1) or open (2).
Magazine 1 Present:	The right-side magazine is installed (1) or removed (0).
Magazine 2 Present:	The left-side magazine is installed (1) or removed (0).
EEP Present:	The entry/exit port (EEP) caddy is installed (1) or removed (0).

System sensor	Description
EEP Locked:	The entry/exit port (EEP) is locked (1) or unlocked (0).
X Axis Home:	The robot is in the home position on the X axis (1) or not (0).
X Axis EOT:	The robot is at the EOT (end of travel) position on the X axis (1) or not (0).
Wrist Back:	The robot wrist position is toward the back of the library (1) or not (0).
Wrist Front:	The robot wrist position is toward the front of the library (1) or not (0).
Bay 1 Occupied: *through* Bay 4 Occupied:	There is a drive or drive blank installed in the drive bay (1) or the drive bay is empty (0). **Note:** Bay 1 is located next to the fixed slots.
Library Fan Fail:	The library's fan is operational (0) or has failed (1).
Drive 1 Fan Fail: *through* Drive 4 Fan Fail:	The fan for the drive is operational (0) or has failed (1). **Note:** Drive 1 is located next to the fixed slots.

Notes

6 Tape Drive Operation

This chapter describes how to perform the following tasks:

- Monitoring the tape drive status
- Cleaning the tape drives
- Ejecting a cartridge manually
- Resetting a tape drive

Note: The application software automatically controls the tape drives to perform backup and restore operations. You do not need to intervene in the cartridge processing; however, you may need to occasionally perform the tasks described in this chapter.

Monitoring tape drive status

You can monitor the status of the tape drives in several ways:

- Reading the LEDs on the front of the drive
- Viewing the library's Drive Display screens
- Viewing the library's Drive Status screens

Note: You can also view drive status using Console, part of the library's internal firmware. See Chapter 7 for more information.

Reading the tape drive LEDs

The following tables show the tape drive LED states for Exabyte M2 drives and Sony SDX-500C AIT-2 drives. To read the LEDs, you must open the library door, as described on page 63.

Exabyte M2 LED states	
LED states[a]	**Condition**
All LEDs on	The tape drive was reset or is performing its power-on self-test.
Top LED on	Cleaning required.[b]
Top LED flashing	Hardware error.
Middle LED on	A tape is loaded and the tape drive is ready to perform tape motion activities.
Bottom LED flashing	Tape motion. A fast flash indicates high-speed tape motion.

[a] You may see other LED activity (random flashing, steady on, and so on). For a detailed description of the drive's LED states, refer to the product specification for your tape drive (available in viewable, PDF format at www.exabyte.com).

[b] Manual cleaning is required when standard AME media has been used extensively in the M2 tape drive.

Sony SDX-500C AIT-2 LED states	
LED states[a]	**Condition**
Busy (left) LED on	SCSI activity is occurring.
Tape (middle) LED on	Tape is loaded.
Status (right) LED on	Cartridge is write-protected.
Tape LED is flashing (0.25 seconds on; 0.25 seconds off)	Tape is loading or unloading.
Tape LED is flashing (3.5 seconds on; 0.5 seconds off)	Error has occurred.
Status LED is flashing (3.5 seconds on; 0.5 seconds off)	Cleaning required.[b]

[a] You may see other LED activity. For a detailed description of the drive's LED states, refer to the documentation for the SDX-500C tape drive (available at www.storagebysony.com/support/consumer.asp).

[b] Manual cleaning is required when the tape drive has been operating in extreme environmental conditions.

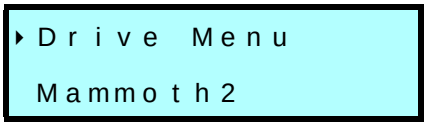
Viewing the Drive Display screens

You can view additional information about the drive's status from the Drive Display screens.

Note: The M2 tape drives installed in the library do not include liquid crystal displays (LCDs). However, you can view a drive's LCD messages from the Drive Display screens.

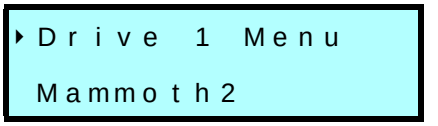
To view the Drive Display screens:

1. From the operator panel keypad, press MENU to display the menus. Press the down arrow key until "Drive Menu" appears.



Note: On the second line of the Drive Menu, the tape drive model name appears (either Mammoth2 or AIT).

2. Press ENTER. The Drive 1 Menu appears.



3. Use the up or down arrow key to select the desired drive menu, then press ENTER. (For example, to show information for Drive 1, select "Drive 1 Menu.") A screen similar to the example below appears.

Note: Drive 1 is the tape drive closest to the fixed cartridge slots; Drive 2 is located directly to the right of Drive 1; and so on.

4. Press the down arrow until "Drive *n* Display" appears, then press ENTER.

The following table lists some messages that can appear for the M2 tape drive. For a complete list, see the *Mammoth-2 Product Specification*.

M2 drive display messages	
Tape drive status messages	
READY–NOTAPE	The tape drive is ready to accept a cartridge.
LOADING	The tape drive is loading the tape.
READY–TAPE	The tape drive has successfully loaded the tape and is ready for read/write operations.
EJECT	The unload button was pressed. The tape drive ejects the cartridge as soon as it finishes its current operation.
EJECT–PREVNT	The software has disabled the eject function with the PREVENT/ALLOW MEDIA REMOVAL command. The tape drive will rewind and unload the tape, but will not eject the cartridge.
ILLEGAL TAPE	The tape drive detected an incompatible cartridge and ejected it.
Tape motion messages	
READ +	The tape drive is reading or writing data. The + sign appears when the tape drive is in compression mode.
WRITE+	
PROTECTED	The tape drive cannot write data because the data cartridge is write-protected.
ILLEGAL WRT	The tape drive cannot write to the type of data cartridge inserted. This message remains until an unload/eject operation is performed.
SEARCH	High-speed search is in progress.
REWIND	Rewind is in progress.
ERASE	The tape drive is erasing data on the tape.

M2 drive display messages	
FORMAT	The tape drive is repartitioning the tape to the requested format.
WORN TAPE	The tape currently in the tape drive has exceeded the tape drive's maximum tape passes threshold and must be replaced.
Cleaning messages	
CLEAN SOON[a]	The tape drive should be cleaned at the next convenient time.
CLEANING . . .	Cleaning is in progress.
DEPLETED	The cleaning tape in the cartridge is depleted and the tape drive will eject it. Use a new cleaning cartridge.
CODE LOAD FAIL	These messages appear in sequence after the code load failed.
RETRY CODE LOAD	
MAKE CODELOAD TP	The tape drive is making a code load tape.

[a] These messages appear when non-SmartClean media is used and the tape drive is cleaned using an Exabyte Mammoth Cleaning Cartridge.

The following table lists some messages that can appear for the AIT-2 tape drive.

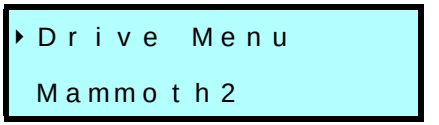
AIT-2 drive display messages	
Tape drive status messages	
READY–NOTAPE	The tape drive is ready to accept a cartridge.
LOADING	The tape drive is loading the tape.
READY–TAPE	The tape drive has successfully loaded the tape and is ready for read/write operations.
Tape motion messages	
READING	The tape drive is reading or writing data.
WRITING	
TAPE IN MOTION	The drive is moving tape.
SPACE FORWARD	The tape drive is performing a forward search.
REWIND	Rewind is in progress.
ERASE	The tape drive is erasing data on the tape.
UNLOADING	The tape drive is unloading tape.
Cleaning messages	
CLEAN DRIVE	The tape drive should be cleaned at the next convenient time.
CLEANING . . .	Cleaning is in progress.

Viewing the Drive Status screens

From the Drive Status screens, you can view status information about the tape drives. These information screens are updated whenever there is a change in drive status.

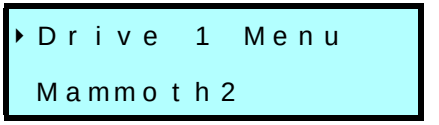
To display tape drive information:

1. From the operator panel keypad, press MENU to display the menus. Press the down arrow key until "Drive Menu" appears.

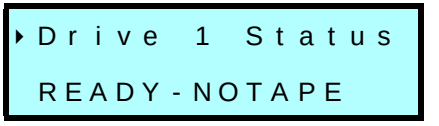


   Note: On the second line of the Drive Menu, the tape drive model name appears (either Mammoth2 or AIT-2).

2. Press ENTER. The Drive 1 Menu appears, which shows the type of drive currently installed in drive bay 1.



3. Use the up or down arrow key to select the menu of the drive for which you want to display information, then press ENTER. (For example, to show information for Drive 1, select "Drive 1 Menu.") A screen similar to the example below appears.



4. Press ENTER.

5. Use the arrow keys to scroll through the status screens.

The following table describes the information in the Drive Status fields.

Drive status field	Description
Type	Identifies the tape drive model.
Serial Number	Displays the drive's serial number.
Inq Version	Displays the four-character Inquiry version returned by the drive's SCSI Inquiry command.
Boot Version (M2 only)	Displays the code level of the drive's boot ROM.
Flash Version (M2 only)	Displays the code level of the drive's flash firmware.
EEPROM Version (M2 only)	Displays the code level of the drive's EEPROM.
Needs Cleaning	Indicates if the drive needs cleaning (1) or not (0).
Cart Status	Displays the status of the cartridge, if any, in this tape drive.
Format	Displays the data format of the cartridge currently in the tape drive.
Tape Left (M2 only)	Displays how much tape is left, in megabytes, for the cartridge in this tape drive.
Tape Size (M2 only)	Displays the total amount of tape, in megabytes, for the cartridge in this tape drive.

Drive status field	Description
Power-on Seconds (M2 only)	Displays the power-on seconds.
Warning	Indicates if the drive is free of errors (0) or displays an error code.
Present	Indicates whether a drive is not installed (0) or is installed (1).
Access	Indicates if the drive is not present or there is a tape inside the drive (0), or the drive is present and there is no tape inside the drive (1).
Occupied	Indicates whether no cartridge is loaded in the tape drive (0) or a cartridge is loaded in the tape drive (1).
Occup Valid (Occupied Valid)	Indicates that the occupied information may not be reliable (0) because the door has been opened or some other interruption or the occupied information is reliable (1).

Cleaning the tape drives

When a tape drive does require cleaning, the library displays a cleaning message on the Status Screen. You can clean the tape drives in several ways:

- Use the Clean Drive option (as described in this section) to manually clean the drives when the library or software notifies you to do so.
- Use the Autoclean option (see page 39) and store a cleaning cartridge in the appropriate slot (see page 18). The Autoclean option instructs the library to clean the tape drives automatically when necessary and without disrupting normal library operations.
- Set the cleaning option in your software application (if available) so that the software monitors drive cleaning. If your application software supports automatic cleaning, store a cleaning cartridge in the slot specified by the application.
- Clean the drives manually by using the entry/exit port and the Move Cartridge command to insert the cleaning cartridge (see "Replacing cartridges using the entry/exit port" on page 60). The tape drive automatically performs the cleaning process and unloads the cartridge when the process is complete (in several minutes). Use the Move Cartridge command and the entry/exit port to remove the cleaning cartridge.

Note: If you use AME media with SmartClean exclusively, the M2 tape drives automatically perform the cleaning operation using the cleaning material in the cartridges. If you use standard AME media, the M2 drives may require regular cleaning with an Exabyte Mammoth Cleaning Cartridge (see "Selecting cleaning cartridges" on page 13).

Setting up for the Clean Drive option

Before using the Clean Drive option, you must install a cleaning cartridge in the appropriate cleaning slot and must set the drive cleaning options.

Installing a cleaning cartridge

For the cleaning operation, install an approved cleaning cartridge in the library, as described on page 18.

Configuring the library for cleaning

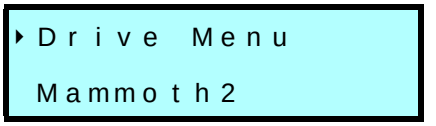
Before you begin the procedure for drive cleaning, make sure you have set the following configuration options:

- Clean Slot option, which designates a permanent storage location for a cleaning cartridge. See "Setting the Clean Slot option" on page 38.
- Clean Cycles Left option, which is a counter that tracks the number of times a cleaning cartridge has been used. When you install a new cleaning cartridge, you must use this option to set the number of cleaning cycles that remain. See "Setting the Clean Cycles Left option" on page 41.

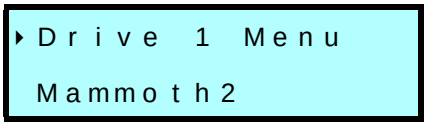
Using the Clean Drive option

1. If security has been enabled, disable it (see page 48).
2. Make sure a cleaning cartridge is installed, the Clean Slot option is set, and the Clean Cycles Left option is set, as described above.
3. Change the control mode to LCD (see page 68).

4. From the operator panel keypad, press MENU to display the menus. Press the down arrow key until "Drive Menu" appears.



5. Press ENTER. The Drive 1 Menu appears.



6. Use the up or down arrow key to select the menu for the drive you want to clean, then press ENTER. (For example, to clean Drive 1, select "Drive 1 Menu." To clean Drive 2, select "Drive 2 Menu," and so on.) A screen similar to the example below appears.

Note: Drive 1 is the tape drive closest to the fixed slots; Drive 2 is located directly to the right of Drive 1; and so on.

7. Use the down arrow key to select "Clean Drive *n*," where *n* is the number of the tape drive you want to clean. Then press ENTER.

The following activities occur:

- The robot picks the cleaning cartridge from the fixed slot and inserts it in the tape drive you specified.
- The tape drive automatically performs the cleaning process and ejects the cartridge when the process is complete (in several minutes).
- The robot automatically picks the cleaning cartridge from the tape drive and replaces it in the designated fixed slot.

8. Confirm that the cleaning completed successfully by looking at the library's LCD information. The cleaning message should be gone. If the cleaning was not successful, the cleaning material in the cartridge may be expended. Replace the cleaning cartridge and clean the tape drive again.

> **Important** If the tape drive ejects the cleaning cartridge immediately after loading it, you need to replace the cleaning cartridge. To order cleaning cartridges, contact Exabyte (see "Contacting Exabyte" on the inside back cover).

9. When the cleaning is complete, return the library to its original control mode and re-enable security (if desired).

Note: After cleaning, the library automatically decrements the Clean Cycles Left counter. However, if you install a new cleaning cartridge, you must manually reset the Clean Cycles Left counter (see "Setting the Clean Cycles Left option" on page 41).

Ejecting a cartridge manually

If a problem occurs that requires intervention, you may need to manually eject a cartridge.

> **CAUTION**
>
> Discharge static electricity from your body before touching the drive's front panel components. Touch a known grounded surface, such as the library's metal chassis.

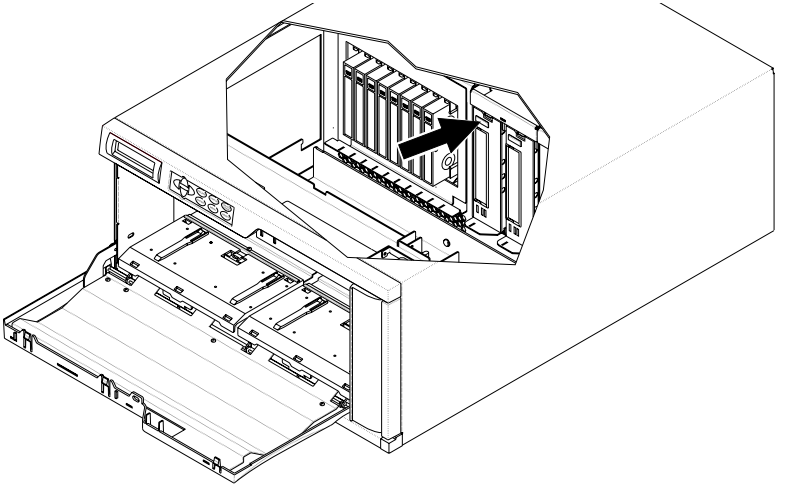
To manually eject a cartridge:

1. Open the library door (see page 63) and remove the magazine on the right side.

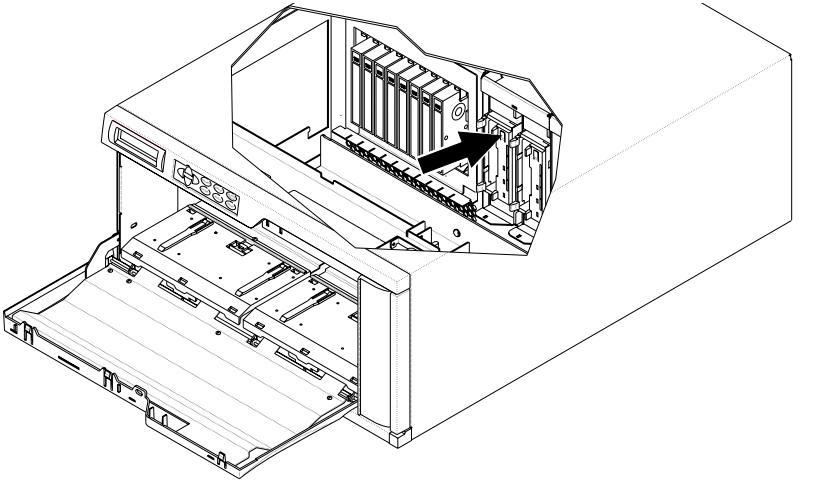
2. Press the eject button on the tape drive's faceplate (shown in the following figures) and remove the cartridge.

   Note: For Exabyte M2 tape drives, do not press and hold the eject button for more than 10 seconds. Holding down the button causes the M2 tape drive to reset.

The eject button for the M2 drive is shown below.



The eject button for the AIT-2 drive is shown below.



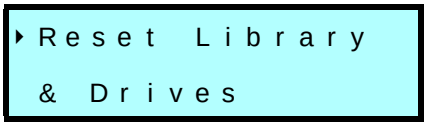
Resetting a tape drive

This section describes how to reset a tape drive from the library's front panel.

> **CAUTION**
>
> Before resetting the tape drive, make sure the tape drive is not communicating across the SCSI bus. Resetting the tape drive may disrupt communications on the SCSI bus.

To reset a tape drive:

1. Press the RESET key on the library's operator panel. The following screen appears.



2. Use the down arrow key to display "Reset Drive *n*," where *n* is the number of the drive you want to reset. For example, the screen shown below is for resetting Drive 2.

Note: Drive 1 is the tape drive closest to the fixed slots; Drive 2 is located directly to the right of Drive 1; and so on.

3. Press ENTER. At the confirmation prompt, press ENTER again.

The tape drive performs its power-on self-test and rewinds any loaded tape to the beginning, but does not eject the cartridge. If a cartridge is loaded in the drive, this reset may take several minutes, depending on the size of the cartridge.

Note: Because the tape drive rewinds the tape and does not eject the cartridge, make sure that it is safe to overwrite the tape before performing a backup. Otherwise, manually eject the cartridge as described on page 101.

7 Diagnostics and Firmware

This chapter describes how to do the following:

- Upgrade library firmware via Console
- Create a diagnostic listing via Console
- View the LCD password via Console
- Upgrade library firmware via FTP
- Create a diagnostic listing via FTP
- Communicate with a Mammoth-2 tape drive

This chapter uses the following conventions:

- Keys shown boldfaced in brackets are keys you press on your host computer's keyboard (for example, **[Enter]**).

- Words shown in Courier are commands you type (for example, `redraw`).

Connecting to the Console interface

This section describes how to access the Console interface, the library's internal diagnostics firmware. You can use Console for upgrading firmware, creating a diagnostic listing, and viewing the LCD password.

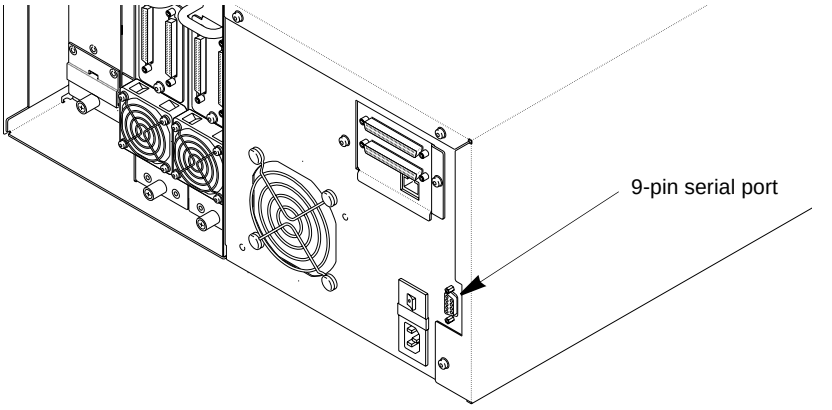
Before accessing Console, you must have the following:

- Host computer that uses an RS232 serial port
- A straight-through 9-pin serial cable (not a null modem cable)
- Terminal emulation software, such as HyperTerminal

Note: Exabyte recommends using HyperTerminal, a standard communications package available with Microsoft Windows®.

Connecting the serial cable

Connect the 9-pin cable to the back of the library and to a serial port on the host computer. The following figure shows the location of the 9-pin serial port on the back of the library.

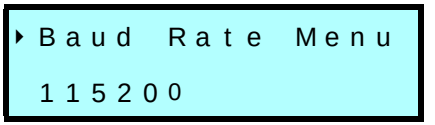


Setting the library's baud rate

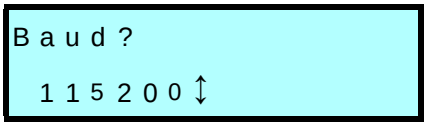
Before accessing Console, you must set the baud rate for the library so that it matches the host computer's baud rate.

To set the library's baud rate:

1. From the operator panel keypad, press MENU to display the menus. Press the down arrow key until "Config Menu" appears, then press ENTER. The Baud Rate Menu displays the currently selected baud rate, similar to the following example.



2. Press ENTER. An informational message appears, then the following screen appears.



3. Use the up or down arrow key to select the baud rate that matches the baud rate of the host computer, then press ENTER.

Accessing Console using HyperTerminal

Note: These instructions assume you are using HyperTerminal, a communications package available with Microsoft Windows. If desired, you can use a different terminal emulation software package.

To access Console using HyperTerminal:

1. From your computer, launch HyperTerminal.

2. In HyperTerminal's Connection Description screen, enter a name and choose an icon for this communications session.

3. In HyperTerminal's Connect To screen, choose the communications port you are using from the Connect Using field. Click OK.

4. In the Properties screen, make sure the fields contain the following values, then click OK.

   - *Bits per second*: (baud rate of the computer)
   - *Data bits:* 8
   - *Parity bits:* none
   - *Stop bits:* 1
   - *Flow control:* none

5. Check the ASCII setup from HyperTerminal:

   a. From the File menu, select Properties.

   b. In the Properties screen, select the Settings tab.

   c. In the Emulation mode field, select "ANSI."

   d. Click on the ASCII Setup button.

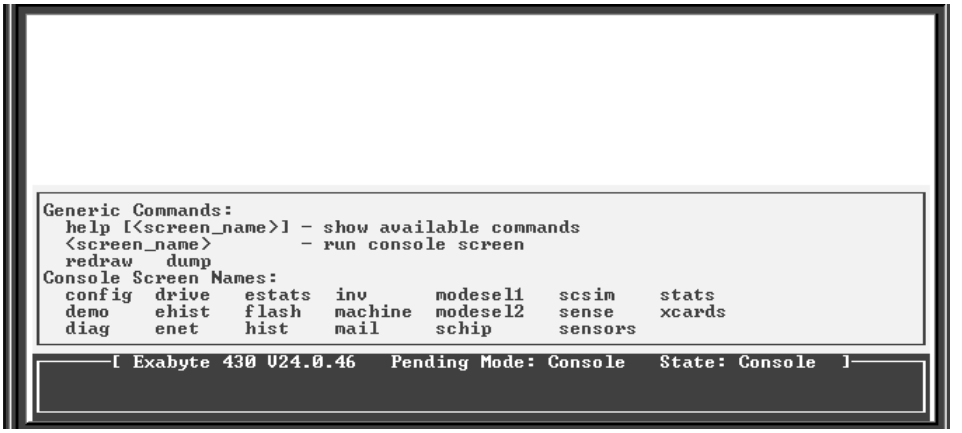
   e. In the ASCII Setup screen, make sure none of the boxes have check marks. Uncheck the boxes, if necessary.

   f. Click OK in the ASCII Setup screen.

   g. Click OK again in the Properties screen.

6. The Console program should now appear in HyperTerminal's main window. If necessary, type `redraw` and then press **[Enter]** to refresh the screen.

7. If desired, type `help` and then press **[Enter]** to display Console's Help screen, as shown in the following figure.



Note: If garbled characters or no characters appear on the screen, make sure you have the same baud rate set for the host as you do for the library.

Upgrading library firmware via Console

These instructions describe how to upgrade the library firmware using the Console interface.

> **CAUTION**
>
> Do not upgrade firmware unless Exabyte Technical Support has advised you to do so. If performed improperly, the upgrade procedure can render your library inoperable. Consult with Exabyte Technical Support before performing an upgrade.

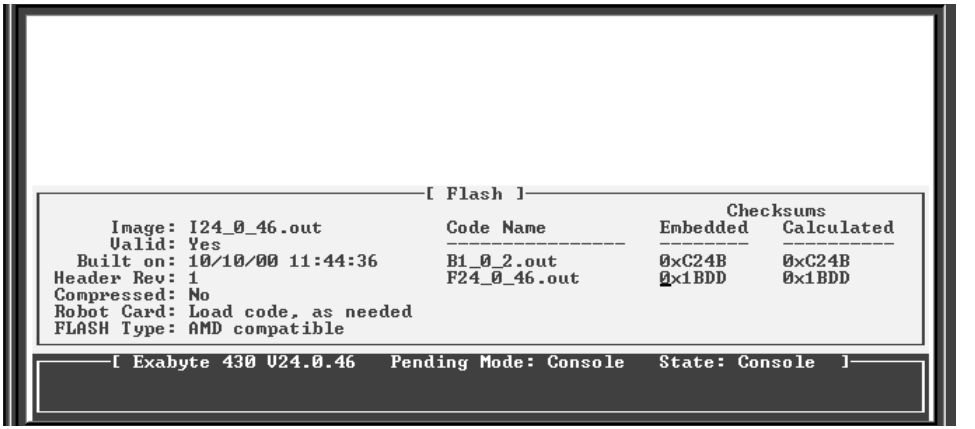
To upgrade the library firmware:

1. Obtain new firmware for the library. You can download new firmware from Exabyte's web site (www.exabyte.com), or you can contact Exabyte Technical Support.

2. Access Console by following the steps in "Connecting to the Console interface" on page 106.

3. If desired, you can use the SCSI READ BUFFER command to copy the current firmware to a disk. To do this, use a software application that can issue SCSI commands. For more information about the SCSI commands, refer to the SCSI reference for your library.

4. From Console, type: `flash` and press [**Enter]**. This displays the Flash screen, as shown below.



5. In the Flash screen, type: `loadimage` and press [**Enter].**

6. Use your terminal emulation software to specify the source location (path and filename) of the new firmware. For HyperTerminal, follow these steps:

   a. Select the Transfer menu.

   b. Select Send File.

   c. In the Send File screen, enter the path and file name of the firmware or click on the Browse button to locate the file. Select XModem as the protocol.

   d. Click on Send.

The system initiates the firmware upgrade and displays its progress on the screen. When the upgrade is successfully complete (in about four to five minutes), the library automatically performs a power-on reset.

> **CAUTION**
>
> Do not attempt to perform library operations or power down the library until after the library automatically resets.

Creating a diagnostic listing via Console

If you report a problem to Exabyte Technical Support, you may be asked to create a library diagnostic listing (also called a *dump*) via the Console interface. A diagnostic listing is created when you use a terminal emulation program (such as HyperTerminal) to send an ASCII text copy of the diagnostic buffer from the library to the host computer. This buffer information can be used by support personnel to troubleshoot incidents with the library.

Note: These instructions assume you are using HyperTerminal, a communications package available with Microsoft Windows. If desired, you can use a different terminal emulation software package.

To create a diagnostic listing:

1. Access Console by following the steps in "Connecting to the Console interface" on page 106.
2. Type `dump` and press **[Enter]**.
3. Select the Transfer menu, then select Capture Text.
4. In the Capture Text screen, enter the path and filename for the ASCII text file and press **[Enter]**.
5. Press **[Enter]** again to start transferring the ASCII text file.
6. When the transfer is complete, select the Transfer menu, then select Capture Text and Stop.

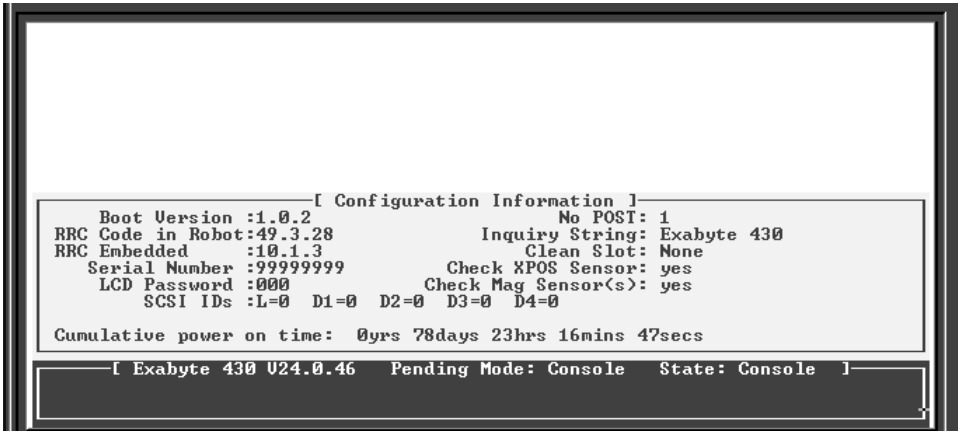
Viewing the LCD password via Console

You can view the LCD password from the Configuration Information screen in the Console interface.

To view the LCD password:

1. Access Console by following the steps in "Connecting to the Console interface" on page 106.

2. Type `config` and press **[Enter]**. The Configuration Information screen appears, as shown below. The password appears next to the LCD password field.



Connecting to an FTP utility

This section describes how to connect your library to a host computer and how to access an FTP utility. You can use an FTP utility to upgrade library firmware or create a diagnostic listing.

Before accessing an FTP utility, you must have the following:

- Host computer that uses a pin-through-hole RJ-45 shielded Ethernet connector
- A Category 5 (100BaseT connection) data-grade cable
- Software that supports RFC 959 file transfer protocol
- Library with an Ethernet option

To connect to an FTP utility:

1. Connect the Ethernet cable as described on page 56.
2. From your host computer, activate the FTP utility you are going to use.

   Note: If you do not know the FTP user name or password, you can view them from the Ethernet Security screen (see page 54).

Upgrading library firmware via FTP

These instructions describe how to upgrade the library firmware via FTP.

> **CAUTION**
>
> Do not upgrade firmware unless Exabyte Technical Support has advised you to do so. If performed improperly, the upgrade procedure can render your library inoperable. Consult with Exabyte Technical Support before performing an upgrade.

To upgrade the library firmware:

1. Obtain new firmware for the library. You can download new firmware from Exabyte's web site (www.exabyte.com), or you can contact Exabyte Technical Support.

2. Connect to an FTP utility by following the steps in "Connecting to an FTP utility" on page 114.

3. If desired, you can make a copy of the current firmware by using a `get` FTP command. If necessary, you can obtain the current library firmware version number as described on page 81.

> **CAUTION**
>
> Do not attempt to perform library operations or power down the library until after the library automatically resets.

4. Use the FTP command for your utility to transfer the new firmware to the library. For example, you can issue `put filename.out`, where "`filename.out`" is the name of the new firmware.

The system initiates the firmware upgrade and displays its progress on the library's LCD screen. When the upgrade has completed successfully, the library automatically resets.

Creating a diagnostic listing via FTP

If you report a problem to Exabyte Technical Support, you may be asked to create a library diagnostic listing (also called a *dump*) via FTP. A diagnostic listing is created when you use an FTP utility to send an ASCII text copy of the diagnostic buffer from the library to the host computer. This information stored in the diagnostic buffer can be used by support personnel to troubleshoot incidents with the library.

To create a library diagnostic listing via FTP:

1. Access the FTP utility by following the instructions in "Connecting to an FTP utility" on page 114.

2. Make sure the FTP file transfer type is set to ASCII.

3. Use the FTP command for your utility to get the diagnostic listing. For example, issue: `get libtrace.txt`.

4. If necessary, specify a destination location (path and filename) for the diagnostic listing.

Communicating with an M2 tape drive

These instructions describe how to establish communications with an M2 tape drive using the library's serial port and Exabyte's Mammoth-2 Monitor program, so you can upgrade the drive firmware or create a diagnostic listing.

> **CAUTION**
>
> Do not upgrade firmware unless Exabyte Technical Support has advised you to do so. If performed improperly, the upgrade procedure can render your drive inoperable. Consult with Exabyte Technical Support before performing an upgrade.

Setting up the hardware and software

Before upgrading the drive firmware, obtain the following:

- Host computer that uses an RS232 serial port.
- A straight-through 9-pin serial cable (not a null modem cable).
- Windows 95, 98, 2000, or NT 4.0.
- Exabyte Mammoth-2 Monitor program. You can download this software from Exabyte's web site (www.exabyte.com) or request it from Exabyte Technical Support.

Note: If you will be upgrading drive firmware, you can download new firmware from Exabyte's web site (www.exabyte.com) or you can contact Exabyte Technical Support for firmware.

Establishing drive communication

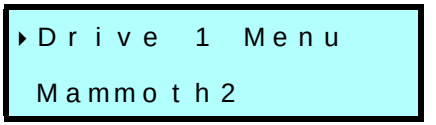
To establish communication with the tape drive over the library's serial port:

1. Connect the serial cable to the library and host computer (see page 106).

2. If necessary, disable security (see page 48).

3. Change the robot control mode to LCD (see page 68).

4. From the operator panel keypad, press MENU to display the menus. Press the down arrow key until "Drive Menu" appears, then press ENTER. The Drive 1 Menu appears.



5. Use the up or down arrow key to select the menu for the desired drive, then press ENTER. (For example, to establish communications with Drive 1, select "Drive 1 Menu.") A screen similar to the example below appears.

6. Press ENTER. Use the up or down arrow key to select "Connect Serial Port to Drive *n*."

7. Press ENTER. At the confirmation prompt, press ENTER again. The tape drive is now communicating through the library's serial port.

8. When you are ready to return the serial connection to the library, press ENTER.

Note: If you reset the library or you open and close the front door, the library disconnects from tape drive serial communication.

Using Mammoth-2 Monitor

To use Mammoth-2 Monitor:

1. If necessary, download the Mammoth-2 Monitor software from Exabyte's web site (www.exabyte.com). Make sure you download the version that matches your operating system.

2. Install Mammoth-2 Monitor on your host computer and then launch the software.

3. Refer to the Help file provided with the Mammoth-2 Monitor software for instructions on setting up the program.

Notes

8 Maintenance and Service

This chapter describes the following:

- Using touch-up paint on the housing
- Cleaning the library
- Installing or replacing the tape drives
- Returning the library for service

> **CAUTION**
>
> Unless you have a self-maintenance contract with Exabyte, do not attempt to replace any components in the library, other than the tape drives. If you do so, you will void your warranty.

Using touch-up paint on the housing

A paint kit is available for touching up nicks and scratches on the finish. For ordering information, see "Contacting Exabyte" on the inside back cover.

Cleaning the library

The only library components that should be cleaned are the tape drives. Instructions for cleaning the tape drives are provided on page 97.

> **CAUTION**
>
> The library's internal components are lubricated at the factory and should not be cleaned or relubricated. To protect the internal components from dust, keep the library door closed.

Installing or replacing a tape drive

This section describes how to install an additional tape drive or replace an existing tape drive. You can order tape drives from Exabyte. The tape drive will be shipped to you in the drive carrier. You cannot install a tape drive into the library without a drive carrier.

➤ **Important** Do not mix different types of tape drives and SCSI configurations in the library. For example, do not install an HVD tape drive in an LVD library or install an AIT-2 tape drive in a 430M library.

Preparing for replacement

1. Obtain a # 2 Phillips screwdriver.

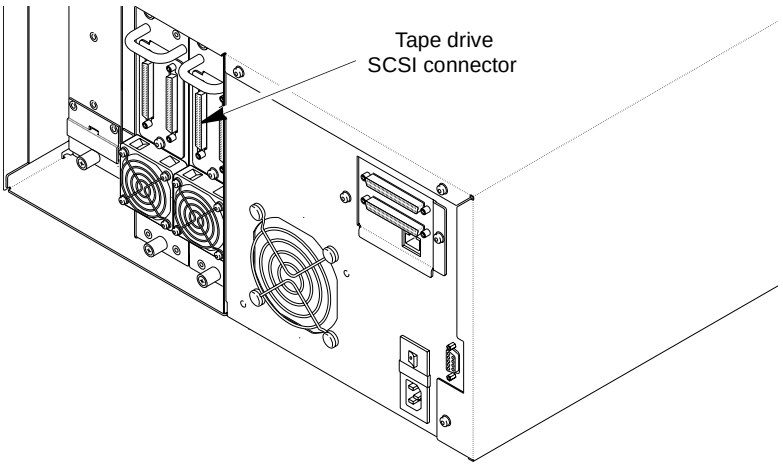
2. Ensure that the environment is free of conditions that could cause electrostatic discharge (ESD). If possible, use an antistatic mat and grounded static protection wristband during installation. If a mat and wristband are not available, touch a known grounded surface, such as the computer's metal chassis.

3. Power off the library and disconnect the power cord.

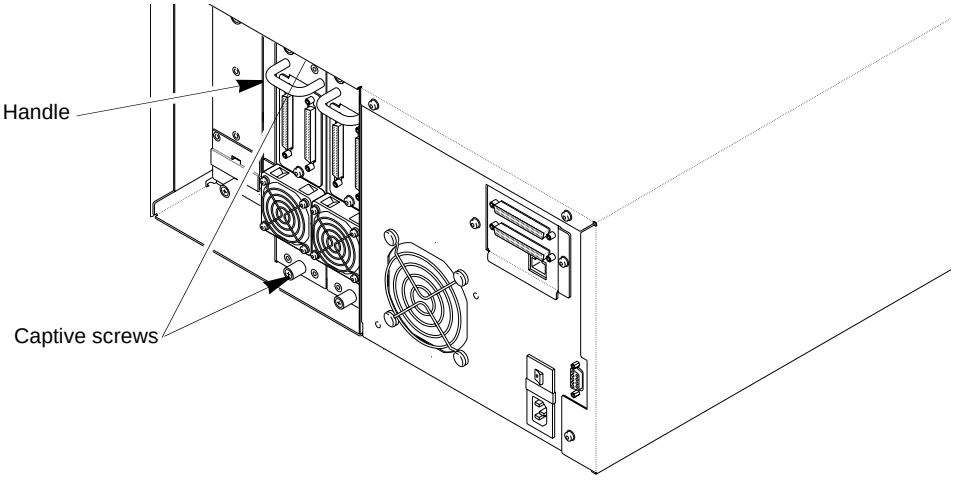
Removing the tape drive

If you are replacing an existing tape drive, follow the steps below to remove the drive. (If you are installing an additional tape drive, skip to "Removing the drive's service access cover" on page 124.)

1. Disconnect the SCSI cables from the back of the tape drive you are replacing. The SCSI connectors for the tape drives are accessible from the back panel.



2. From the back panel, use a # 2 Phillips screwdriver to release the two captive screws that secure the tape drive carrier to the library, as shown in the following figure.



3. Remove the drive carrier by grasping the handle and pulling it directly out of the library.

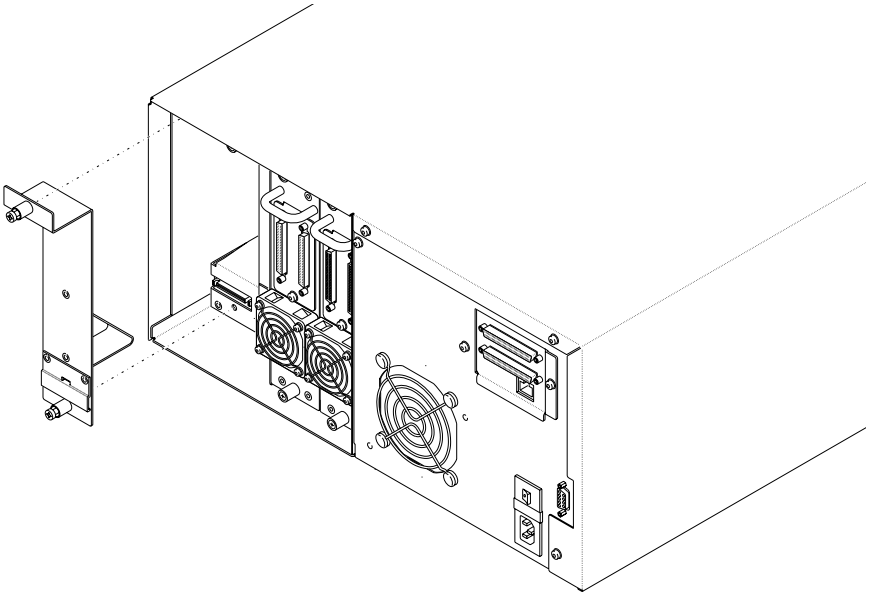
   Note: The drive carrier weighs approximately 5 pounds. Make sure you support the bottom of the carrier as you remove it.

Removing the drive's service access cover

Follow the steps below if you are installing an additional tape drive in an empty drive bay.

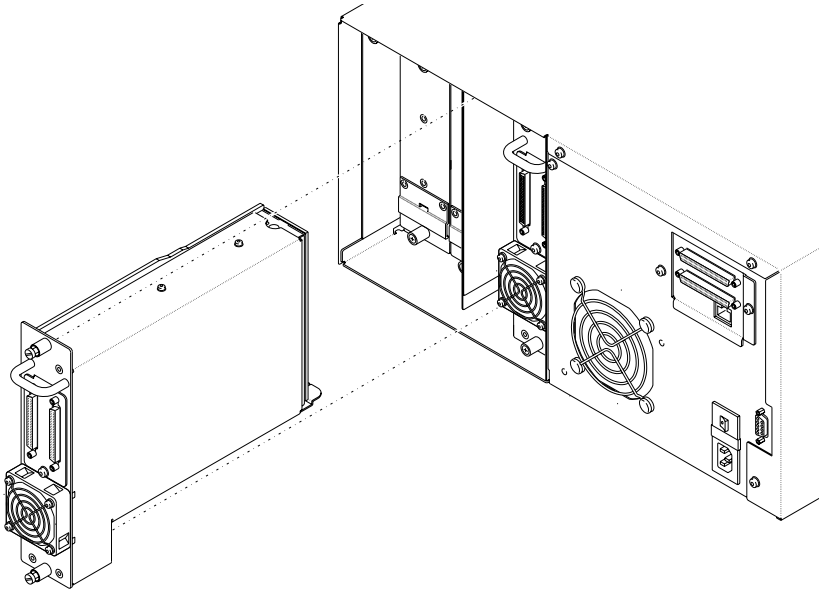
1. From the back panel, use a # 2 Phillips screwdriver to release the two captive screws that secure the service access cover to the library, as shown in the following figure.

2. When the screws are loosened, remove the service access cover.



Installing the tape drive

1. As shown in the following figure, insert the tape drive so that the handle is at the top and the fan is at the bottom. The drive should slide easily toward the front of the library.



2. Tighten the captive screws on each end of the drive carrier to 8.0 inch-pounds (9.2 kg-cm) of torque.

3. Connect the SCSI cables to the tape drive.

> **CAUTION**
>
> To avoid damaging the tape drive, make sure the library is powered off when you connect it to the SCSI bus.

Resuming operations

1. Reconnect the power cord and power on the library.

> **Important** Do not power on the library with an empty drive bay. You must install a tape drive or service access cover in each of the bays.

2. If you installed a new tape drive, set the SCSI ID for the drive, as described in "Setting the SCSI IDs" on page 34. If you replaced an existing drive, the new tape drive automatically assumes the SCSI ID of the old drive.

The library is now ready to resume normal operation. You may want to use the Demo Menu to ensure that the robot and the newly installed tape drive are communicating (see page 77).

If your library does not resume normal operation, check the following:

- Are the devices on each SCSI bus attached to the library all LVD?
- Are the SCSI buses terminated?
- Are the SCSI cables firmly connected to the library and host computer?
- Is a drive or service access cover installed in each drive bay?
- Are the SCSI IDs unique for the devices on each SCSI bus?
- Is the library operating in the correct control mode? (For most applications, the control mode should be set to SCSI.)

If you cannot solve the problem yourself, contact your service provider or Exabyte Technical Support (see "Contacting Exabyte" on the inside back cover).

Returning the library for service

If you need to return the library to the factory for service, contact your service provider. If your service provider instructs you to return the library directly to Exabyte, contact Exabyte Technical Support to obtain a Return Materials Authorization (RMA) number and the shipping address (see “Contacting Exabyte” on the inside back cover). When you have the RMA number, follow the instructions on the following pages.

Preparing the library for shipping

1. Before powering off the library, select “Park and Unlock for Shipping” from the front panel’s keypad. The robot then moves to the correct position to accommodate the packing materials, and the front door unlocks.

2. If necessary, remove all cartridges from the magazines and fixed slots. Make certain the robot gripper, the entry/exit port, and the tape drives do not contain cartridges.

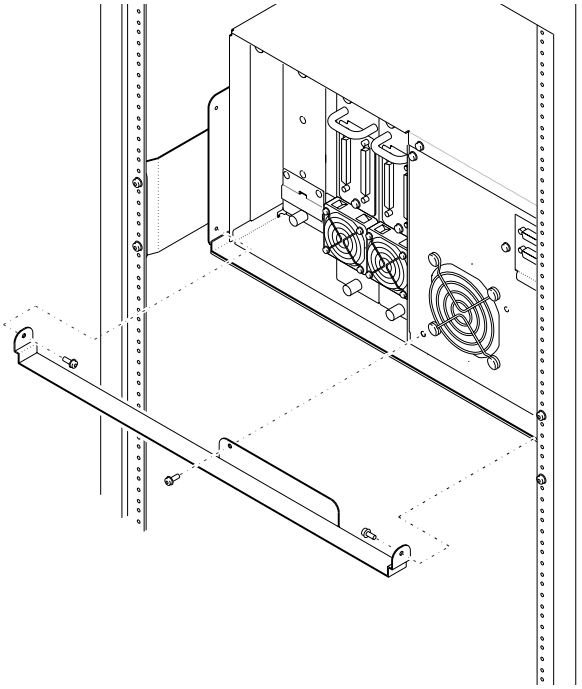
3. Power off the library.

4. Remove the power cord, the SCSI cables, and any terminators. Do not ship these items if you are returning the library to the factory.

Removing the library from the rack

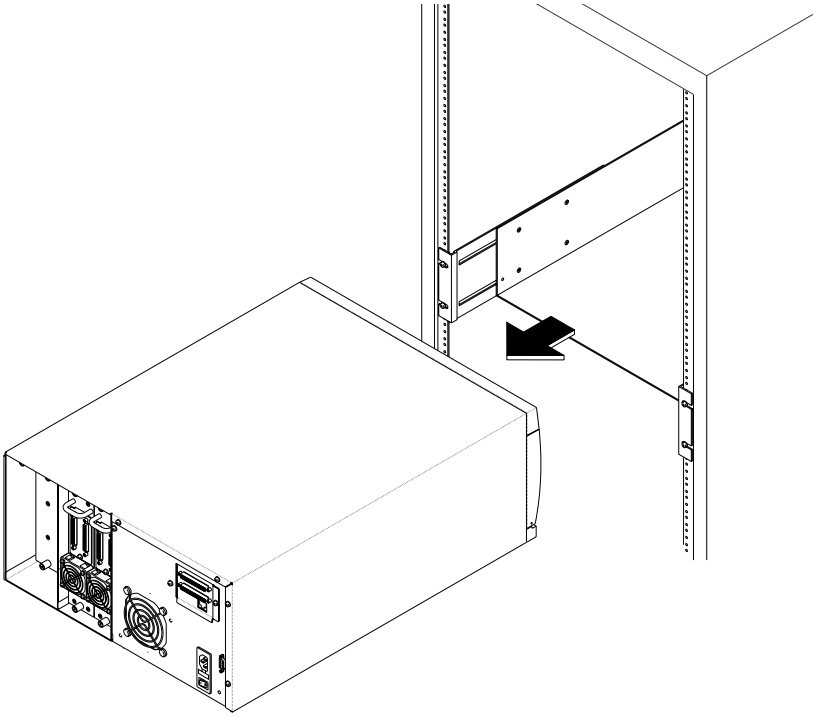
If the library is installed in a rack, remove it as follows:

1. From the back of the library, use a T-20 TORX driver to remove the three screws that secure the retention bracket to the rack shelf and library, as shown in the following figure. Remove the bracket.



2. From the back, slide the library off of the rack shelf.

> **WARNING!**
>
> The library weighs approximately 75 pounds (34 kg). Two people are needed to move or lift the library. Most of the weight is toward the back of the library.



Packing the library

Use the original packing materials to pack the library (shipping containers, robot packing piece, and antistatic bag). You will also need packing tape and banding material.

CAUTION

To avoid damaging the library and voiding your warranty, be sure to use the original shipping materials (or replacement materials obtained from your vendor) when repacking and shipping the library. Do not use the shipping carton and packing materials to ship items other than a library.

WARNING!

The library weighs approximately 75 pounds (34 kg). Two people are needed to move or lift the library. Most of the weight is toward the back of the library.

To pack the library:

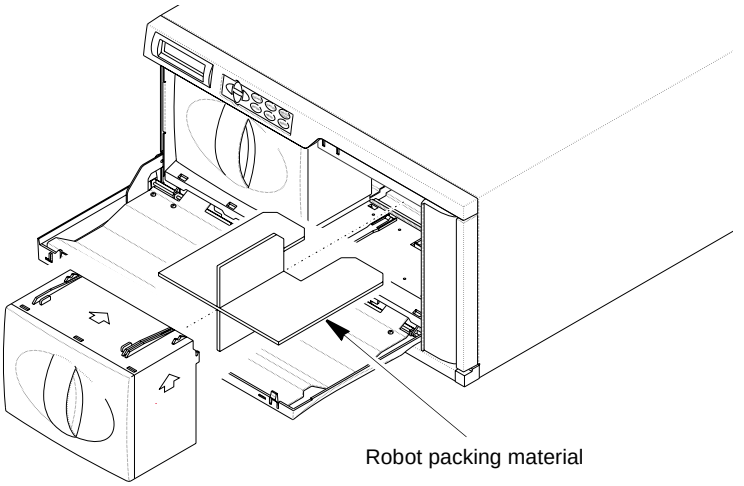
1. Secure the robot in the robot packing piece, as follows:

   a. Remove the magazine on the right side of the library.

   b. Place the robot's packing material inside the magazine so it is centered vertically and horizontally, as shown in the following figure.

   c. Install the magazine in the library, so that the cut-out in the packing material fits around the robot.

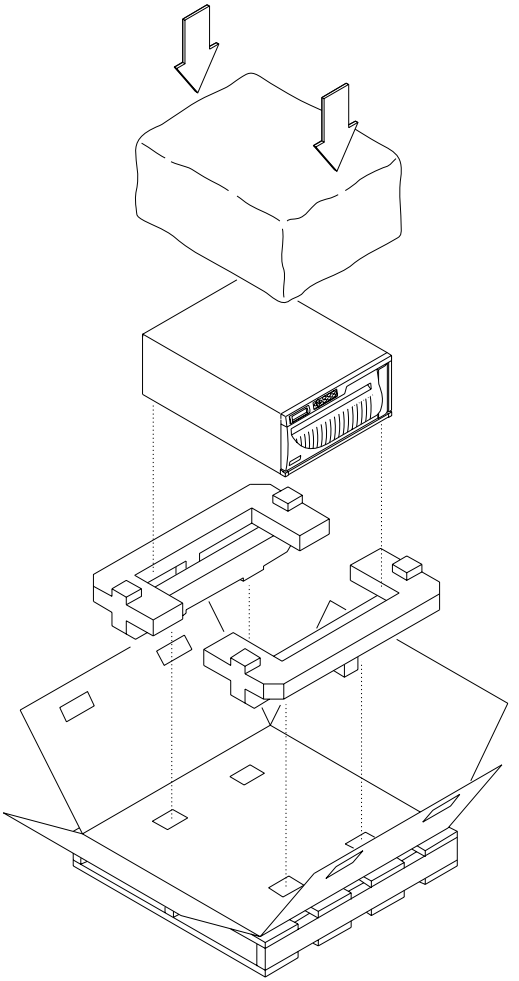
   d. Close the library door.



Note: Be sure to install and ship both magazines in the library.

2. Place the box and two bottom cushions on the pallet, as shown in the following figure.

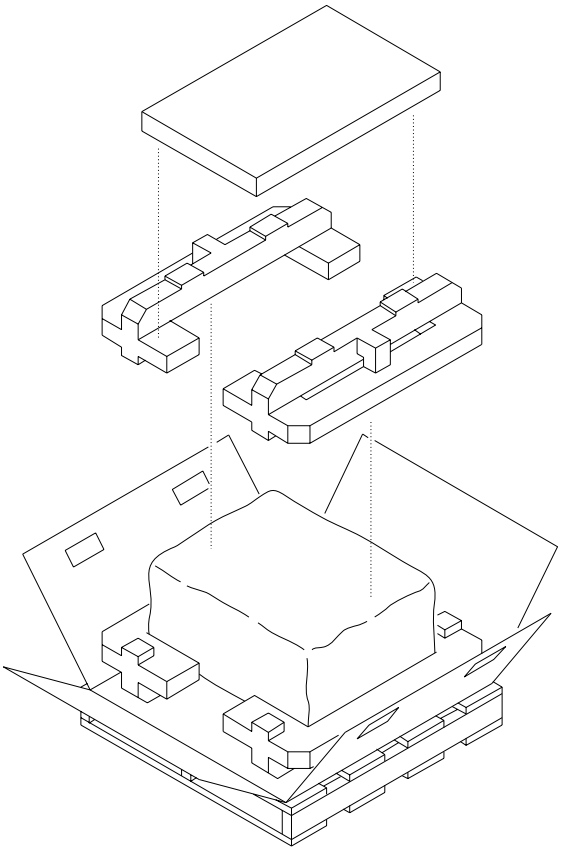
3. Place the library on top of the bottom cushions, then place the antistatic bag over the library, as shown in the following figure.



4. Place the two top cushions on the library, as shown below. (Use the alignment holes in the packing pieces as a guide.)

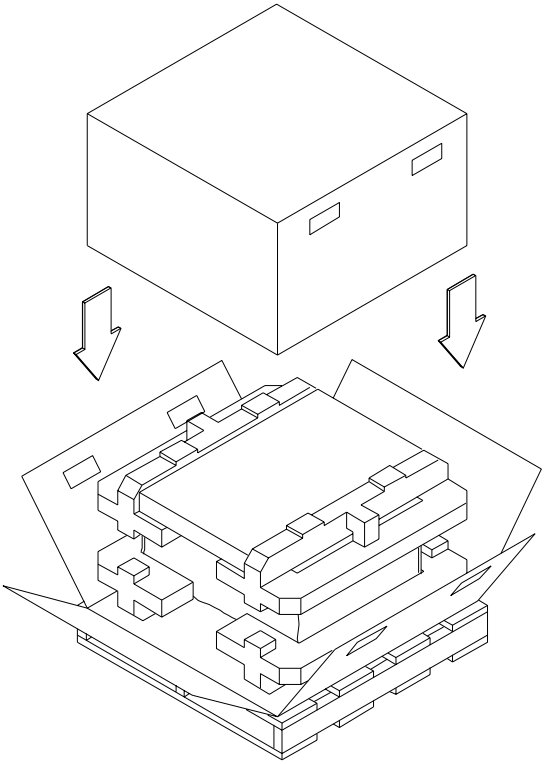
5. If you are shipping accessories with the library, place the accessory box on top of the cushions, as shown below.

➤ **Important** If you are shipping the library for repair, do not include the accessories.

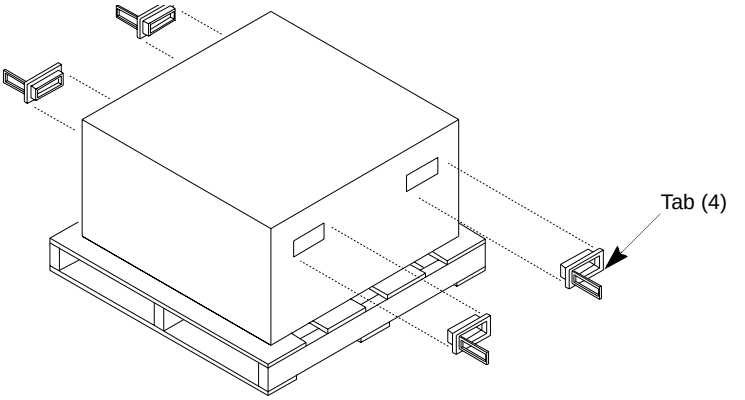


6. Lay the necessary paperwork in the top of the accessory box.

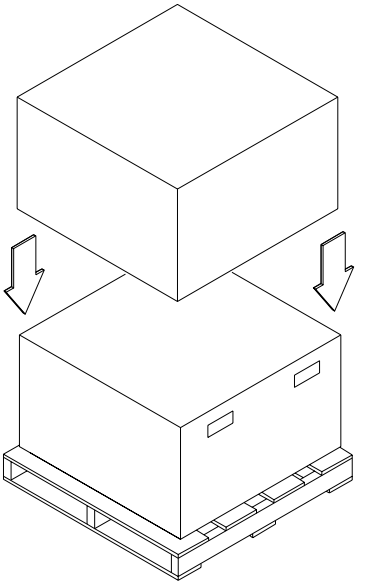
7. Fold the side flaps up and place the carton over the library, as shown in the following figure.



8. Insert the four plastic clips into the openings in the sides of the carton and press the tabs into the handle, as shown in the following figure.

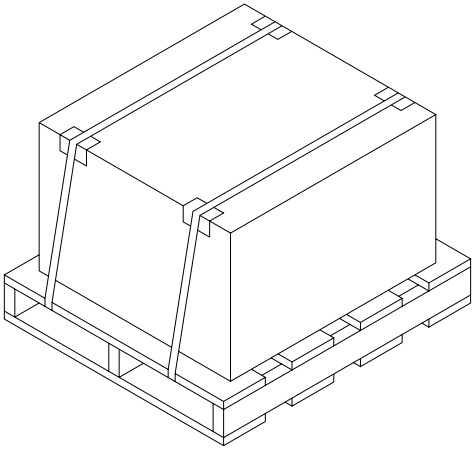


9. Place the outer sleeve over the entire box, as shown below.



10. Place the shipping label on the box.

11. Secure the box to the wooden pallet using banding material.



Notes

9 Troubleshooting

This chapter provides troubleshooting information for the library. It provides a list of suggestions for solving problems that may occur when you are installing and operating the library and the enclosed tape drives.

Note: If an error code appears on the LCD, refer to Appendix C. If LEDs on the tape drive are flashing, see page 88.

Problems with library installation

If your library and software are not communicating after installation and configuration, check the following:

- ✔ **SCSI IDs.** Make sure that the SCSI IDs you selected for the tape drives and library are not the same as the ID used by any other SCSI device on that bus, including the SCSI adapter card. Refer to page 34 for information about setting the SCSI IDs.

- ✔ **SCSI bus connections.** Make sure that you have connected the SCSI cables to the appropriate SCSI connectors on the back of the library. See page 21 and Appendix B for more information.

- ✔ **SCSI cabling.** Make sure that all SCSI cables are securely connected at both ends.

- ✔ **LVD, HVD, and single-ended SCSI devices.** Because the library is an LVD device, all other devices on the SCSI bus should also be LVD. Do not connect an HVD device to an LVD bus.

- ✔ **Narrow SCSI and wide SCSI.** Because the library is a wide SCSI device, all other devices on the bus must be wide. Or, you must use wide-to-narrow adapters.

- ✔ **SCSI cable lengths**. Make sure the internal SCSI cabling does not exceed maximum lengths (see page 147).

- ✔ **Termination**. Make sure your bus is properly terminated as described in Appendix B. If another SCSI device previously terminated the SCSI bus and is no longer at the physical end of the bus, be sure to remove the terminators from that device.

- ✔ **Compatibility.** Make sure that your tape drive and library are compatible with the SCSI adapter card and application software you plan to use. Visit Exabyte's web site at www.exabyte.com for compatibility information.

- ✔ **SCSI adapter card installation.** Make sure that you installed your SCSI adapter card correctly. Refer to the documentation that came with your card for installation and troubleshooting instructions. Pay special attention to steps describing setting various jumpers and switches on the card. Make sure that the card is properly seated.

- ✔ **Software installation.** Make sure that your application software is installed correctly. Refer to the documentation that came with your software. Pay special attention to steps describing configuring the software for use with the library and tape drives.

✔ **Control mode.** Make certain the control mode is set to SCSI. See page 68 for more information.

After checking the items above, reset the library as described on page 74.

Problems with tape drive operation

If you have been successfully operating the application software and library in the past, but are now experiencing problems reading and writing data, check the following:

✔ **Write-protect switch**. If you are writing data, make sure the cartridge is write enabled.

✔ **Cartridge type**. Use the cartridge types recommended on page 11.

✔ **Cartridge age**. If the cartridge has been in use for a long time or if it has been used frequently, try using a new cartridge.

✔ **Cleaning**. Clean the tape drive as described on page 97.

Problems with library operation

If the library has been successfully operating in the past, but is now experiencing problems, check the following:

- ✔ **Control mode**. If you are using an application software package to control robot operations, the library must be set to SCSI mode. See page 68 for more information.

- ✔ **Security**. Make sure that security is set correctly for the operation you are trying to perform. If security is enabled, you cannot perform many operations on the LCD and you cannot open the door. Security can be enabled from the LCD (see page 46) or from your application software with a SCSI command.

- ✔ **Door open**. Make sure the door is closed securely.

- ✔ **Empty drive bay**. If you removed a drive from one of the bays, you must install a service access cover (see page 122).

- ✔ **Robot operation**. You can use the selections in the Command Menu and the Demo Menu (described in "Performing hardware exercises" on page 75) to determine if the robot is functioning properly.

A Specifications

This appendix provides overall specifications for the library, media capacities, power cord requirements, SCSI cable specifications, SCSI terminator requirements, and Ethernet cable specifications.

Overall specifications for the library

The following table provides general specifications for the library.

Interface specifications	
Interface	SCSI-2, Ultra, Ultra-2
Capacity and speed	
Maximum capacity (430M M2 library)	4.5 TB with four M2 tape drives (assumes a 2.5:1 compression ratio)
Maximum capacity (430A AIT-2 library)	3.8 TB with four AIT-2 tape drives (assumes a 2.6:1 compression ratio)
Maximum transfer rate (430M M2 library)	432 GB per hour with four M2 tape drives
Maximum transfer rate (430A AIT-2 library)	224.6 GB per hour with four AIT-2 tape drives

Size and weight	
Size	8.65 high × 17.25 wide × 24.10 long (inches) (21.98 × 43.82 × 61.21 cm)
Weight[a] (430M M2 library)	76 pounds (34.5 kg)
Weight[a] (430A AIT-2 library)	71 pounds (32.2 kg)
Operating environment	
Ambient temperature	+ 5°C to + 35°C (+ 41°F to + 95°F)
Relative humidity	20% to 80%, noncondensing
Wet bulb	26°C (79°F) max
Power	
Input voltages	Accepts 100 to 240 VAC at 50 to 60 Hz; automatic input voltage selection
Power consumption (430M M2 library)[b]	103 watts (average AC true power, idle) 140 watts (average AC true power, operating) 152 watts (maximum AC true power, operating)
Power consumption (430A AIT-2 library)[b]	80 watts (average AC true power, idle) 105 watts (average AC true power, operating) 120 watts (maximum AC true power, operating)
BTU output (430M M2 library)	478 BTUs per hour (average heat output)
BTU output (430A AIT-2 library)	359 BTUs per hour (average heat output)

[a] Assumes four tape drives are installed, two magazines, and no cartridges.

[b] Assumes four tape drives are installed.

Media capacities

This section provides the maximum capacities of the media.

AME with SmartClean media for M2 drives

The following table provides the approximate capacities in gigabytes (GB) for each AME cartridge with SmartClean.

	Maximum capacity	
Tape length	**Native**	**Compressed[a]**
225 meters	60 GB	150 GB
150 meters	40 GB	100 GB
75 meters	20 GB	50 GB

[a] Assumes a 2.5:1 compression ratio. Actual compressed capacity varies depending on the type of data being recorded.

AME media for AIT-2 drives

The following table provides the approximate capacities in gigabytes (GB) for each AIT-2 cartridge.

	Maximum capacity	
Tape length	**Native**	**Compressed[a]**
230 meters	50 GB	130 GB
170 meters	36 GB	94 GB

[a] Assumes a 2.6:1 compression ratio. Actual compressed capacity varies depending on the type of data being recorded.

Power cord requirements

The library is shipped with a seven-foot (2.1 meter), 18 AWG, three-conductor AC power cord for 120-volt use in the United States and Canada. The power cord has a molded NEMA 5-15P male connector on one end and a molded IEC 320/EN60320 female connector on the other end. The power cord is UL Listed and CSA Certified. If you are planning to use an input voltage other than 120 volts AC or if you plan to use the library outside of the United States or Canada, you must supply your own power cord, as described below.

Criteria for U.S. and Canadian 220 VAC power cord:

- The power cord must have a molded NEMA 6-15P attachment plug on one end.
- The power cord must have a molded IEC 320/EN60320 female connector on the other end.
- The cordage must be an SJT or SVT type, 3-conductor, 18 AWG minimum.
- The power cord must comply with local electrical code.

Criteria for an international 220 VAC power cord:

- The power cord must have an attachment plug of the proper type, rating, and safety approval for the intended country.
- The power cord must have an IEC 320/EN63020 female connector on one end.
- The flexible cord must be harmonized to CENELEC publication HD-21. The electrical characteristics and rating must be minimum H05VVF3G0.75 (6 A).

SCSI cable and terminator specifications

This section describes the SCSI cable and terminator requirements.

SCSI cables

Exabyte recommends using wide LVD SCSI cables that conform to SCSI-3 specifications for impedance and primary conductor.

> ➤ **Important** To comply with the regulations and standards listed at the front of this book, all SCSI cables you use with the library must be properly shielded.

SCSI cable length

The maximum allowable cable length for an LVD SCSI bus, including all internal and external cables, is specified as follows:

- If you have more than two devices on the LVD bus, the maximum allowable length is 12 meters (39 feet).
- If you are making a point-to-point connection (target and initiator only), the maximum length is 25 meters (82 feet).

To determine the cable length of the bus, measure the lengths of all external SCSI cables. Add those lengths together. To that sum, add 20 centimeters (8 inches) for the internal cable length used by each tape drive and 5 centimeters (2 inches) for the internal cable length used by the robot.

SCSI terminator

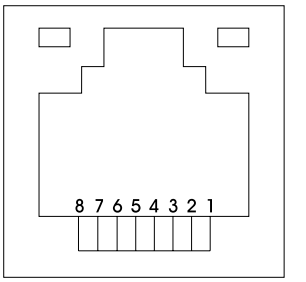
Exabyte recommends using an active terminator, such as the AMP 796051-1 (SE/LVD Multi-mode) SCSI terminator. Termination must be external; do not use internal terminators.

Ethernet cable requirements

As an option, the library may include an Ethernet port on the back panel. The Ethernet port connector is an RJ-45 shielded connector. To connect to the Ethernet port, use an approved Category 5 (100BaseT connection) data-grade cable compliant with EIA/TIA 568.

➤ **Important** To comply with the regulations and standards listed at the front of this book, all Ethernet cables you use with the library must be properly shielded.

The following table indicates the Ethernet port's pin assignments, functions, and location.

Pin number	Function	Pin location
1	TD+	
2	TD–	
3	RD+	
4	Not used	
5	Not used	
6	RD–	
7	Not used	
8	Not used	

B SCSI Configuration

This appendix provides an overview of the SCSI interface and some general guidelines for connecting the library to the SCSI bus.

SCSI components

The SCSI system consists of the following components:

- **Initiator.** The host computer system acts as the initiator of commands. It consists of the application software, the operating system, the device driver, and the SCSI adapter card.
- **Bus.** The SCSI cables connected to the adapter card and to the library (as well as other devices on the bus) provide a pathway (or "bus") for passing commands.
- **Targets.** The library and the tape drives are peripheral devices (or targets) that are capable of receiving commands from the host. Up to sixteen devices (including the host computer) can be connected to the wide SCSI bus and up to eight devices can be connected to the narrow SCSI bus.

SCSI bus considerations

This section provides the basic guidelines and considerations for setting up the library on the SCSI bus.

LVD SCSI

The Exabyte 430M uses an LVD (low-voltage differential) SCSI configuration. Every SCSI device attached to the SCSI buses connecting to or from the library must also be LVD.

Note: Although LVD SCSI is compatible with single-ended SCSI, Exabyte does not support single-ended devices on the library's LVD SCSI bus.

Do not connect the LVD library to a high-voltage differential (HVD) SCSI bus.

Wide SCSI

The library is available in a wide configuration only. If desired, you can attach the library and tape drives to a narrow SCSI bus using adapters available from Exabyte. However, attaching the tape drives to a narrow bus will significantly reduce performance.

If you want to connect the library to a narrow SCSI bus, you must use a 50-pin to 68-pin LVD SCSI adapter. Make sure that the adapter terminates all unused data lines.

SCSI IDs

Each device on the SCSI bus must have a unique ID. The host computer uses these IDs to identify each device. The SCSI ID also determines which device has priority when more than one device is trying to communicate with the host. The lower the ID, the lower the priority of the device.

Note: A device's SCSI ID does not depend on physical location. For example, the last device on a multi-device SCSI bus can have a SCSI ID of 2.

The library can use five SCSI IDs, one for the robot and one for each tape drive. Separate IDs allow the robot and tape drives to operate as independent devices, receiving different sets of SCSI commands from the host.

SCSI bus termination

If the library is the last device on the SCSI bus, you must terminate the bus by installing an active terminator on the library's unused SCSI connector. The library does not supply terminator power.

For the recommended terminator to use with the library, see page 148.

Notes

C Error Codes

This appendix describes the error codes that appear on the library's LCD (liquid crystal display). LCD error codes do not reflect tape drive errors (see page 88).

> **CAUTION**
>
> Library components can be replaced only by Exabyte-approved service providers. If you cannot find an obstruction or other obvious cause for the problem, contact your service provider. Unless you have a self-maintenance contract, do not attempt to replace any components. If you do, you will void your warranty.

For detailed information about SCSI error conditions, refer to the library's SCSI reference.

CAUTION

Some corrective actions advise you to reset the library. Before resetting, make sure there is no SCSI activity on any connected SCSI bus, so you do not disrupt communications.

The following table lists the library hardware error conditions in numerical order.

LCD code	Description	Corrective action
11	**Source empty.** There is no cartridge in the source location.	Install a cartridge in the source location or redirect the robot to another location.
12	**Destination full.** A cartridge already exists in the destination location.	Remove the cartridge from the destination or redirect the robot to another location.
13	**Put failure.** The robot could not place a cartridge because of mechanical problems.	▪ Open the door and remove the magazines. Make sure there is nothing blocking the robot or the tape drives. ▪ Make sure the library and tape drives are not being used by any host, then reset the library. ▪ If the error persists, the robot may need to be replaced. Contact your service provider.
14	**Pick failure.** The robot could not pick a cartridge because of mechanical problems.	
15	**No source element.** No magazine was installed at the selected location.	▪ Install a magazine or redirect the robot. ▪ If a magazine is already installed when either of these error codes displays, reset the library. ▪ If the error persists, contact your service provider.
16	**No destination element.** No magazine was installed at the selected location.	

LCD code	Description	Corrective action
18	**Source inside drive.** The robot could not successfully pick a cartridge because it was still loaded in the tape drive.	▪ Open the door and manually eject the cartridge from the tape drive. Or, redirect the robot to another source location. ▪ If the error persists, contact your service provider.
30	**R axis does not move.** The robot could not move along the reach axis.	▪ Open the door and remove the magazines. Look for anything that might be obstructing the gripper or the robot's path along the reach axis. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If there are no obstructions and the error persists, the robot may need to be replaced. Contact your service provider.
32	**Barcode module failure.** The bar code module is not functioning properly.	▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, the bar code module may need to be replaced. You may need to supply a diagnostic listing; you may need new firmware. Contact your service provider.
34	**RRC sensor failure.** The robot gripper sensor failed.	▪ Open the door and remove the magazines. Look for anything that might be obstructing the gripper or the robot's path along the reach axis. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If there are no obstructions and the error persists, the robot may need to be replaced. Contact your service provider.
35	**RRC communication failure.** The library cannot communicate with the robot gripper command processor.	▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, the robot may need to be replaced. Contact your service provider.

LCD code	Description	Corrective action
36	**RRC command reject.** An invalid command was sent to the robot command processor.	▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, the robot may need to be replaced. Contact your service provider.
38	**Cannot load drive.** The robot cannot push the cartridge far enough to load it into the tape drive.	▪ Open the door and remove the magazines. Look for anything that might be obstructing the robot along its reach axis. ▪ Make sure the library and tape drive are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.
41	**W axis failed home.** The library could not move the robot to the home position on the wrist axis.	▪ Open the door and remove the magazines. Look for anything that might be obstructing the wrist axis rotation. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.
42	**Wrist front sensor failed.** The library could not determine the position of the robot on the wrist axis.	
43	**Wrist back sensor failed.** The library could not determine the position of the robot on the wrist axis.	
60	**No label.** The bar code scanner could not read the bar code label because there was no label on the cartridge or the label was unreadable.	This error appears on the Label Information screen. ▪ If the cartridge has a label, reposition or replace it (see page 10). ▪ If the label does not contain a checksum character, make sure the Verify Barcode Checksums option is off (see page 43). ▪ If the error persists, contact your service provider.

LCD code	Description	Corrective action
62	**Not present**. The bar code scanner could not read the bar code label because the designated element is not present.	This error appears on the Label Information screen. If necessary, install a magazine or tape drive.
64	**Bad label checksum**. The bar code scanner could not read the label because of a problem with the checksum character.	This error appears on the Label Information screen. ▪ If the label does not contain a checksum character, make sure the Verify Barcode Checksums option is off (see page 43). ▪ Check the label for damage and replace the label if necessary (see page 10). ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.
70	**Mbus failed.** The robot command processor experienced an error.	▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, the robot may need to be replaced. Contact your service provider.
72	**Front door is open.** The front door was open at an invalid time; or the door sensor is malfunctioning.	▪ Close and lock the door. ▪ Reset the library from the operator panel. ▪ If the error persists, the solenoid or door sensor may need to be replaced. Contact your service provider.
73	**Stepper move fail.** The firmware failed to complete a stepper move.	▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.

LCD code	Description	Corrective action
74	**Unoccupied drive bay.** A tape drive or service access cover is not installed in the drive bay.	▪ Install a tape drive or a service access cover. ▪ If the error persists, contact your service provider.
75	**Internal S/W error.** Firmware error.	▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider. You may be asked to supply a diagnostic listing; you may need new firmware.
77	**Interface disabled**. The library was not in the correct control mode when the operator sent a command.	Set the library to the correct control mode (see page 68).
87	**EE caddy removed**. The entry/exit port caddy was removed at an unexpected time.	▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.
89	**Caddy not available**. The entry/exit port caddy was not inserted correctly.	▪ Replace the caddy as described in "Replacing cartridges using the entry/exit port" on page 60. ▪ If the error persists, contact your service provider.
91	**Command aborted**. A diagnostic command was aborted by the operator.	No corrective action required.
95	**Drive removed**. A tape drive was removed while the library was powered on.	Power off the library and install a tape drive or service access cover (see page 122).

LCD code	Description	Corrective action
97	**Drive not present**. A move was requested to a drive that is not installed.	▪ Install a drive in the drive bay or send commands to another drive. ▪ If a drive is already installed when this message appeared, contact your service provider.
109	**Check cleaning tape**. A clean drive operation failed because the drive did not unload the cleaning cartridge within a reasonable amount of time.	▪ Eject the cartridge from the tape drive and remove it manually (see page 101). ▪ Install a new cleaning cartridge into the fixed slot (see page 18).
116	**Drive comm failed.** The library is unable to communicate with the tape drive.	▪ Check the tape drive SCSI ID and change it, if necessary. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider. You may be asked to supply a diagnostic listing; you may need new firmware or a new controller card.
117	**Drive comm timeout.** The library is unable to communicate with the tape drive.	
118	**Drive load command fail**. The library was unable to load a cartridge in the tape drive.	▪ Open the door and remove the magazine. Look for anything that might be obstructing the robot's path along the horizontal axis. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If there are no obstructions and the error persists, the robot or a tape drive may need to be replaced. Contact your service provider.
119	**Drive not ready.** The tape drive did not return Ready status after a reset.	▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider. You may be asked to supply a diagnostic listing; you may need new firmware or a new controller card.
120	**Drive cmd error**. The tape drive failed to respond to a command from the library.	

LCD code	Description	Corrective action
130	**SCSI chip error: SCSI unexpected int; SCSI int stuck error**. There was a SCSI chip failure.	▪ Make sure all SCSI devices are of the same configuration (see "SCSI bus considerations" on page 150 for more information). ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider. You may be asked to supply a diagnostic listing; you may need new firmware or a new controller card.
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140	**Flash erase fail**. The library is unable to erase the flash EEPROM.	▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.
141	**Flash program fail**. The library is unable to program the flash EEPROM.	
142	**Checksum miscompare**. The flash EEPROM checksum was bad.	
143	**Invalid header data**. The flash EEPROM header was invalid.	
144	**Can't program RRC card.** The RRC code load failed.	Reset the library from the operator panel. If the error persists, contact your service provider.
194	**All slots are full**. The robot could not find an empty cartridge slot.	▪ Open the library door and remove at least one cartridge from a magazine or fixed slot. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.

LCD code	Description	Corrective action
195	**All slots are empty**. The robot could not find a cartridge to pick in Demo mode.	Open the library door and insert at least one cartridge in a magazine.
198	**Robot full before command**. The robot, all slots, and all drives contain a cartridge when an Initialize Element Status command was requested.	▪ Open the library door and remove the cartridge from the robot gripper. ▪ Reset the library.
200	**X axis does not move.** The robot could not move along the horizontal axis.	▪ Open the door and remove the magazines. Look for anything that might be obstructing the robot's path along the horizontal axis. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If there are no obstructions and the error persists, contact your service provider.
201	**X axis has failed home.** The robot could not return to the home position along the horizontal axis.	
202	**X axis position sensor failed.** The library could not complete a move along the horizontal axis.	
203	**X axis EOT fail**. The library could not detect the end-of-travel sensor on the horizontal axis.	▪ Open the door and remove the magazines. Look for anything that might be obstructing the robot's path along the horizontal axis. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If there are no obstructions and the error persists, contact your service provider.
204	**X axis home sensor fail**. The library could not detect the horizontal axis home sensor (safe rotate position).	
205	**X axis scan failed**. The library could not complete a move along the horizontal axis.	

LCD code	Description	Corrective action
207	**X axis cal fail.** The robot position along the horizontal axis could not be calibrated.	▪ Open the door and remove the magazines. Look for anything that might be obstructing the robot's path along the horizontal axis. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If there are no obstructions and the error persists, contact your service provider.
213	**Invalid Xcard configuration.** An invalid combination of expansion cards is installed in the library.	▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider. An expansion card may not be properly installed or the wrong card is installed.
214	**Invalid Slot Config.** The Maximum Number of Slots is set to 1 and the last slot is configured as a cleaning slot.	Change the Max Addressable Slot to a value greater than 1 (see "Setting the Max Addressable Slot option" on page 45) or turn off the Clean Slot Option (see "Setting the Clean Slot option" on page 38).
220	**OS failure.** The library's operating system experienced an error.	▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.
221	**Could not set alarm.** The library's operating system experienced an error.	
222	**OS message failure**. The library operating system experienced an error.	

LCD code	Description	Corrective action
226	**Mbus interrupt timeout.** The robot command processor timed out before setting an interrupt.	▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, the robot may need to be replaced. Contact your service provider.
227	**Mbus acknowledge failure.** The robot command processor failed to respond to a command.	
230	**DHCP server timeout**. The Ethernet DHCP server could not assign an IP address for the library.	This error occurs only when the optional Ethernet interface is installed. Set the network address to Static and set the desired IP address (see "Setting Ethernet addresses" on page 52).

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Contacting Exabyte

To obtain technical support	
Exabyte Technical Support	1-800-445-7736
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World Wide Web	www.exabyte.com www.mammothtape.com www.m2wins.com
To order supplies and accessories	
Exabyte	1-800-774-7172 or 1-800-392-8273
To return equipment for service	
Exabyte Service	1-800-445-7736
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Note: If it is more convenient to your location, contact Exabyte Technical Support in Europe at the following numbers:

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